MODEL AIRPLANE NEWS

NOVEMBER 1946 • 20 CENTS
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Flash! PICTURES, STORY & RECORDS OF '46 Nationals

(SEE PAGES 20-22)

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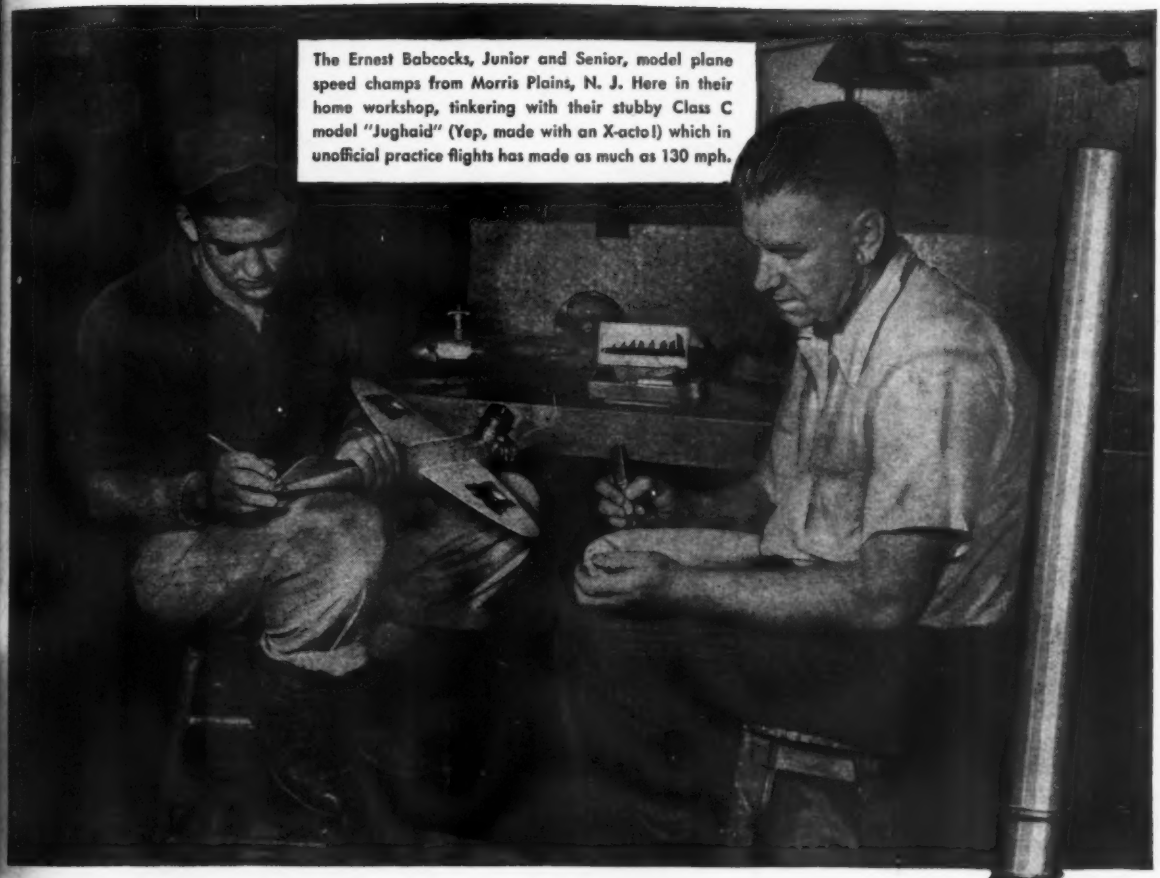

The Ernest Babcocks, Junior and Senior, model plane speed champs from Morris Plains, N. J. Here in their home workshop, tinkering with their stubby Class C model "Jughaid" (Yep, made with an X-acto!) which in unofficial practice flights has made as much as 130 mph.

MEET THE CHAMPS...THE BABCOCK TEAM

...and read what *they* say about X-acto!

When thirteen-year-old Ernest Babcock asked his Dad for a model plane kit four Christmases ago, he got an X-acto Knife Chest, too. But, neither father nor son dreamed, then, that they'd become the nationally famous model plane team they are today.

Dad designs the planes, Junior flies them, but *both* work at building them with their trusty X-actos. Together, the amazing Babcocks have broken more records and run away with more top prizes than most ordinary mortals ever heard of.

Anyone who ever put a knife to wood knows a brilliant record like this takes more than expert skill in designing and handling the planes. It takes the patience of a saint in building accurate models. And it takes good, dependable tools.

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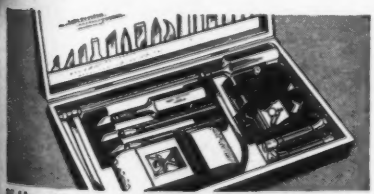

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MODEL AIRPLANE NEWS

JAY P. CLEVELAND
Publisher

NOVEMBER 1946 VOL. XXXV No. 5

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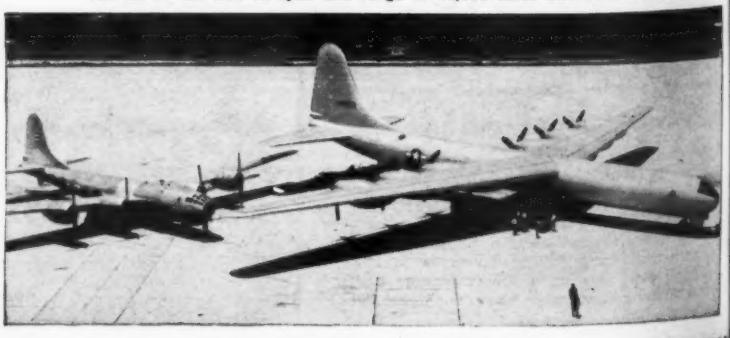
THE FIRST self-propelled guided missile (as distinguished from pilotless aircraft) of wholly American design and manufacture has been announced. It is the GAPA (Ground to Air Pilotless Aircraft), a 10 ft. long, ramjet-propelled missile used against high flying, high speed aircraft. It was produced by Boeing Aircraft Co. and nearly 100 have already been built. The AAF explains that the code name GAPA was assigned the project before the present system of designation was adopted. Although it is designated a pilotless aircraft, it is actually *not* such but a missile due to the fact that it has no wings. The terminology "ground to air" has also been abandoned in favor of SAM, or surface-to-air missile. AAF missiles are now designated as AAM (air-to-air missile), ASM (air-to-surface missile), SAM (above), SSM (surface-to-surface missile) or XM (experimental, non-tactical missile). For example, an ASM-6B would be the second modification of the sixth type of air-to-surface missile. You will be reading more and more about these strange designations. Because a ramjet engine requires considerable forward speed before it develops sufficient thrust to propel the missile, ramjet missiles are launched by rockets. Although the GAPA is, for the reason, rocket launched (leading many reporters to term it a "rocket powered missile") it is propelled in flight by a tiny ramjet engine.

AAF's GUIDED missile research center is located at Wendover Field, Utah, the world's largest airfield containing 900 square miles of hard flat salt beds 12 miles north of Salt Lake City. This center contains housing and facilities for 6,000 officers and men and is administered as a part of Wright Field. Here, experimental missiles are tested for satisfactory operation, and compliance with design specifications and modifications to improve the performance are made. However, the evaluation of the missile as a weapon of war is carried out at Eglin Field, Fla., 40 miles east of Pensacola. These missiles, which are handled by the First Experimental Guided Missiles Group, are fired out to sea up to a distance of 150 miles. A second evaluation

(*Turn to page* 89)

Designer Dewey Eldred with his light seaplane. Ship has a large stowage space and roomy cabin; 125 hp Continental takes it off water in 10 sec. and top speed is 125 mph.

Biggest bomber of 1945 (the B-29) shown with the biggest (so far) of 1946. The XB-36 has 230 ft. span and range of 10,000 miles with bomb load



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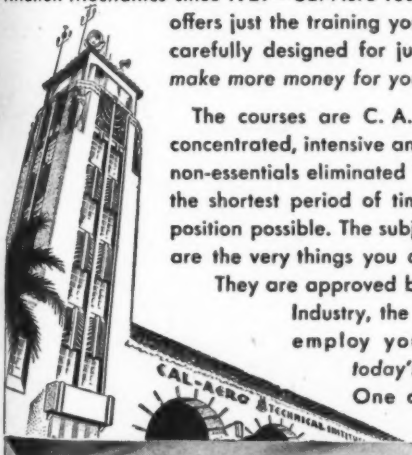

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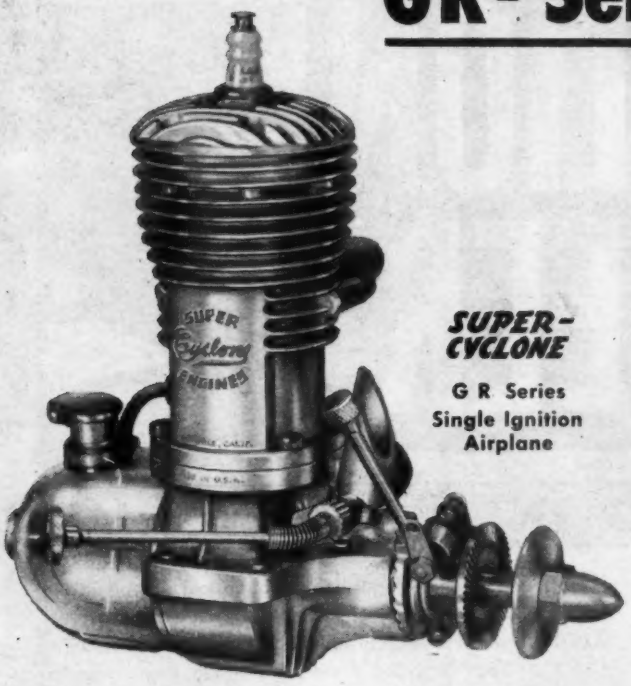

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Model Airplane NEWSLETTER

by AL LEWIS

DR. WALTER A. GOOD of Johns Hopkins University's Applied Physics Laboratory, better known to thousands of contest goers as Walt Good, and one half of the famous Good Brothers championship radio control team, has come up with some new ideas for contest procedure.

Last June, Walt was one of the co-directors of a large contest at Hybla Valley airport, just south of Washington, D.C., and sponsored by the National Airport Club and the Washington *Evening Star*. As a result of his observations at this competition, which was the largest held in the vicinity of the nation's capital since 1940, Walt has come up with three proposals which he offers for consideration and discussion. These suggestions are designed to speed up contest procedure to the point where contestants need not stand around long hours after official flying ends to find out who won. Also, the ideas make for less paperwork, thus cutting down on the chances of posting and tabulating errors.

This contest director's suggestions are for adopting one of the following:

1. Use the official rules as they now stand with the exception that delayed flight times should not be used in final averaging. Experience has shown that this has practically no effect in changing winners in meets conducted under current regulations. Prime virtue of this would be to simplify the record's job of adding up "times."

2. Use present three official flights and nine delays, but record highest single flight as winner. Argue as you will, this procedure does not seriously rearrange winners when compared with the results of a meet held under standard 1946 regulations.

3. Allow each entry three official flights and one delayed flight. Use highest single flight as the scoring method. Examination of the time slips at Dr. Good's Hybla Valley meet shows that delayed flights are consumed by runners-up and not by regular winners. It was found that of the top 12 winners in three events less than one delayed flight was used per entry on the average. Highest single flight for scoring seems just as significant as average time.

The publication of this contest director's findings aroused a storm of comment—some in favor, some agin'. But what many leaders are waiting for with much interest are results of contests run under regular rules but then re-computed for the purpose of study under the three different methods advanced by Dr. Good.

Walt suggests that proposal No. 1 be adopted immediately. He says: "Proposal Nos. 2 and 3 simplify the recording of times considerably but may elicit some arguments. With these, it is proposed that other directors observe the results of their contests to see if Nos. 2 and 3 work out as in the Virginia meet. Adoption of No. 3 would represent a simplification that would result in a smoother, more enjoyable contest for both contestant and contest director."

Leaving rules for a moment, a subject that seems to result in a good argument any time of the day or night when introduced in a conversation between two or more modelers, let us hop over to public relations.

• •

BEFORE THE WAR several meetings were held between interested parties at the national meets relative to the possibility of establishing a model aviation writers association patterned along the lines of the senior Aviation Writers Association. Arthur H.

(*Turn to page* 63)

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WEST COAST TIPS

By JOHNNY DAVIS

HERE'S a thrill for you fellows to think about. This month's column is being written 6000 feet high in the C-47 *Ohlsson & Rice Express* as we journey toward San Francisco from Los Angeles. Aboard ship are some of modeldom's highest ranking citizens: Fred Schrott, head of Duramatics Company; Ray Acord of 1941 National fame, and Ted Gillette, his business partner and contest rival; Harry Balaban, head of Western Distributors; Marvin Irwin, Pres. of *Los Angeles Aero Modelers*, a well known model builder on the Coast as well as in the East; and Col. Bob Johnson (Ret.), proprietor and commandant of Col. Bob's Hangar in Los Angeles. Representing the Los Angeles Junior Chamber of Commerce is Warren Snider, Sec. of Jr. Chamber of Commerce. Lee Wilson of the advertising firm of Hannan & Wilson is also aboard.

Flying the huge Airliner type ship is Harry Rice, production head of Ohlsson & Rice; a veteran of more than 2,000 logged flying hours, Harry has flown practically everything in the book. And riding co-pilot is his business partner, Irwin Ohlsson, of whom practically any model builder even clear over in South Africa has probably heard. Irwin is president of A.M.A. and still very actively supporting the modelers every chance he gets, although heavily engaged in production of the engines manufactured by their company.

Larney Scott of *El Paso Flying Diablos* with his beautiful scale Piper Cub powered by an *Ohlsson 23*. This job has been successfully looped

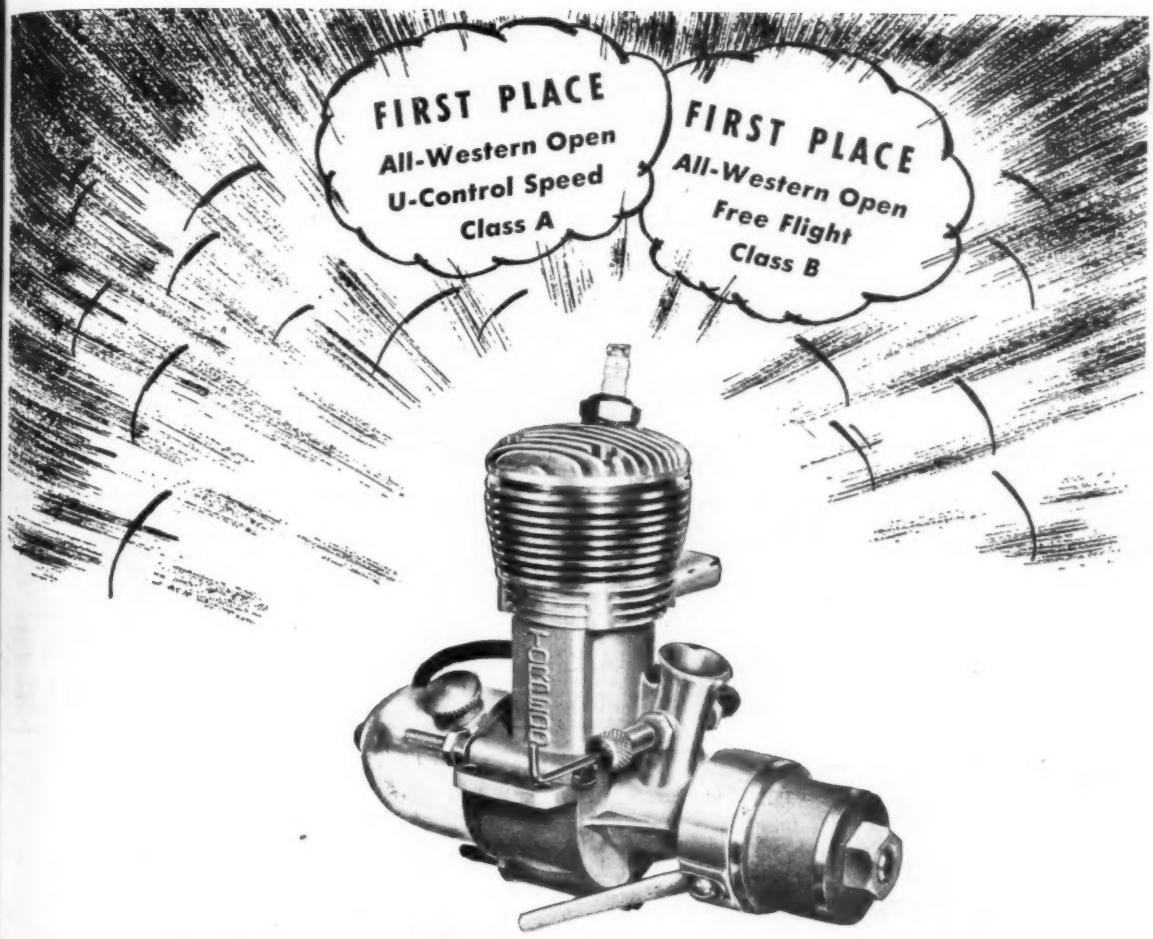
Purpose of the trip is to advertise the coming Western Open which, of course, will be history by the time this hits print; nevertheless this trip deserves mention if for no other reason than to show the united spirit and cooperation being shown throughout the West Coast. It is certain that if all the areas where models are being flown in these United States are as close in spirit and work as amiably together as they do on the Coast, the model business and the model hobby are really going somewhere.

* * *

Sunday, August 4, was the meeting date for the Annual Long Beach National Championship control line contest. It was the seventh in succession, the first being held in 1940. This event is the oldest con-

(*Turn to page* 14)

L. L. Shoyock presenting Charles Bowmen of Berino, N.M., with the trophy he won after a series of precision contests held in El Paso. Mr. Bowman amassed a total of 143 points to win first place. Plane is original design powered by *Cannon 300*



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Once again – here's championship performance, demonstrated and proved by the new, post-war Torpedo B at the All-Western Open meet at Los Angeles, August 24-26.

First place in the U-Control Speed Event for Class A went to Les McBrayer of the Los Angeles Air-O-Modelers Club with a speed of 91.04 MPH – thanks to Torpedo B.

And – first place in Class B Free Flight was captured by Bill Lopez, flying a Torpedo B for the Montebello (California) Model Club with a total flight time of 14.442 minutes.

Watch the Torpedo B's at *every* meet. Championship performance is built into the Torpedo B with precision workmanship and the finest materials.

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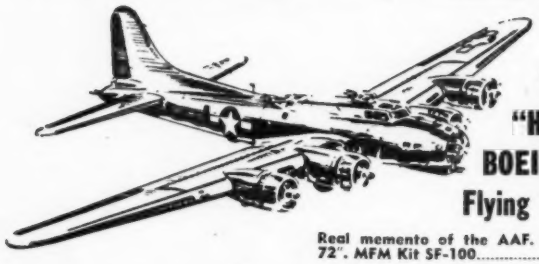

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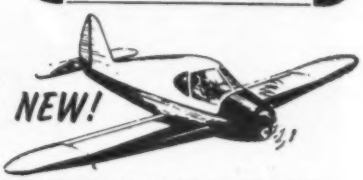
NEW!



CULVER "V" KIT IT-104

STINSON "150" KIT IT-98

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DELUXE SHARPIE

You'll find real fun building this job now, especially with its newly added landing gear. Kit comes packed in colorful red, white and blue star-spangled box, containing full size detailed drawing, right and left solid balsa wing panels, bandsawed to shape, properly tapered tail parts cut to shape, balsa blocks for nose, pine motor mount stock, printed bulkheads, stripwood, wire, nuts, bolts, formed wire landing gear and wheels. Truly a Deluxe kit of this well known easy-to-build control line model. Less Power unit, Kit GPL-5023b. Only..... $2.00

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(*Continued from page* 10)

trol line meet in number of years in succession on the Coast, and is always well attended. In the past, old "Grandpappy" Frank Greene of whom we are sure most of you fellows have heard promoted these meets. This year's meet, however, was put on by George Devers, one of the old standbys of the control line game. Over 3000 spectators attended and 150 planes were entered.

Leaders in miles covered to attend the meet was W. O. Stoltenberg who registered from Davenport, Iowa. He didn't do bad, either, placing seventh in a field of 40 for his first attempt to fly a speed job. He deserves a lot of credit for doing what he did. His ship was an original design, drop-off gear, powered by a McCoy engine, speed 104.14 mph.

George Devers asked us to thank for him the many different judges and timers who helped make the meet a success. George is planning another meet at the same location in November, fellows, so don't put your ships away too soon this winter. (Did we say winter? In California, that is, where the winter is like summer anywhere else, almost!!)

* * *

We received a nice letter from James (Shorty) Brock, Sec. *El Paso Flying Diablos*, otherwise known as the *El Paso Miniature Motor Club*. Our two pictures this month show two of the more successful jobs built by boys in the El Paso area. The Piper Cub built by Larney Scott of El Paso is particularly interesting because of the control arrangement. The rudder is connected by a linkage to the elevator so that when "up" elevator is given the rudder cocks over an additional 15° to 30° to help keep the ship out on the end of the lines.

* * *

On Sunday, July 29, the model builders of Southern California got together for the rally to show their strength at Griffith Park. The Southern California Gas Model Congress as it is now called attracted 300 models and an estimated 15,000 people. Purpose of the rally was to impress the Los Angeles City Council with the need for flying fields for model builders. Several of the City's representatives were there and guest speakers were Russ Walton, Field Chairman of the Western Open and Warren Snider, Secretary of the Los Angeles Jr. Chamber of Commerce.

* * *

The first Model Industry Association Regional meeting on the West Coast in the new postwar period was held August 13 in the banquet room of Hotel Leamington, Oakland, Cal. M.C. of the dinner was Harry Balaban, member of the Board of Directors of the Association, who introduced Fred Schrott as his new associate. Mr. Schrott voiced an appeal for all California dealers, jobbers and manufacturers to get behind the M.I.A. and reap the benefits which so fine an organization confers upon its members. He also brought forth the challenge given California by the states of Illinois and New York, both of whom are trying to surpass California's membership total.

It is a source of pride to the West Coast that although we number far less inhabitants in population than the densely populated Eastern states, we are far ahead of them in model building interests, as well as the industry itself. Mr. Schrott stressed this fact and urged all those interested parties to join with him in pushing a membership drive which would beat Illinois and New York combined.

Credit for the wonderful turnout and delicious dinner should certainly be lavished on the heads of Norbert Cormiere and his associates in Oakland. The affair showed the efforts which they put forth.

That's all, men. See you next month!

Results of 7th Annual National Championship Long Beach Lakewood Baseball Stadium Sunday, August 4

Flying Scale—1. Cedric Galloway—Boeing F4B4, Cyclone 2. I. R. Stewart—F6F, Vivell 3. Troy Burris—P-38, two Bullets 4. J. C. Yates—Lockheed Sirius, Orwick 64. 5. Bobby Brown—Turner-Laird Special, Ohlsson 60.

Individual Stunt—1. J. C. (Upside Down) Yates—Orig. design, Orwick 64. 2. Davis Slagle—Modified Ercoupe, Cyclone. 3. Howard H. Hammill—Orig. design.

Jr. Individual Stunt—1. Bud Jamieson—Rebuilt Playboy.

Class A Speed—1. Norm Morgan—Orig. design, Ohlsson 23, 94.53 mph. 2. Les McBrayer—Sidewinder, Orwick 23, 80.14 mph. 3. James Waltner—Orig. design, Ohlsson 23, 78.23 mph.

Class B. Speed—1. Bob Van Atta—"Dizzy B"—Tiger, 96.41 mph. 2. Keith Storey—Orig. design, Tiger, 95.54 mph. 3. Frank Greene—"Dizzy B"—Tiger, 92.72 mph.

Class C Speed—1. Don Newberger—Orig. design, McCoy, 134.42 mph. 2. Wally Wallach—Orig. design, McCoy, 128.38 mph. 3. Marvin Irwin—Orig. design, McCoy, 116.42 mph.

Note: The speed set by Don Newberger represents the **fastest** yet traveled by **any** contestant in **any** meet. And anybody who thinks he was towing or whipping that airplane should have been there and seen Don with his heels dug in and hanging on for dear life to keep from having the airplane tow him.

PHOTO CREDITS

Page 2 *Top*—International News
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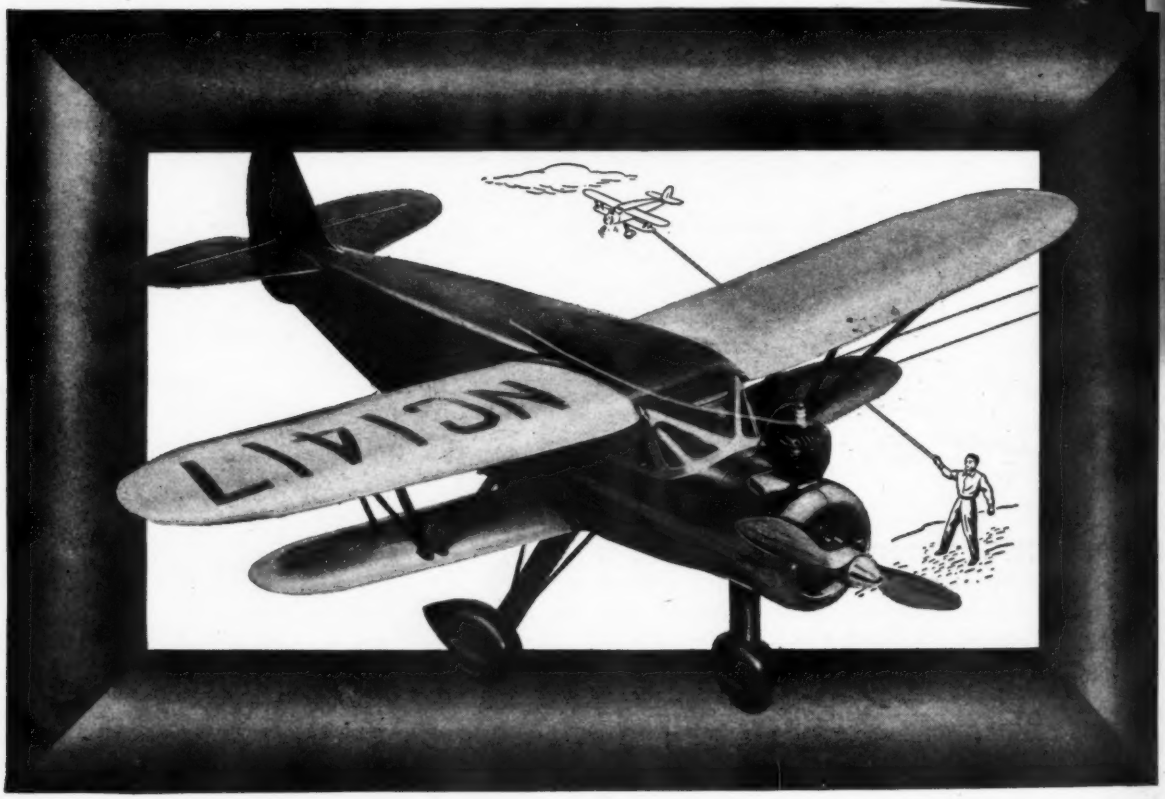
HORNET VICTORIES! Results of the Lockheed Contest April 14, just announced are as follows: SPEED CLASS C—1st, George Berry, 119.84 m.p.h., HORNET: 2nd, Clarence Benskin, 118.80 m.p.h., HORNET: 3rd, Bob Smith, 117.02 m.p.h., HORNET.

If your local hobby dealer does not have HORNET motors in stock, we will ship direct from factory within 24 hours of receipt of order. Send your name and address and those of your hobby dealer with order. California purchasers add 2½% Sales Tax.

THE LATEST IN EAGLE'S "GALLERY OF GREATS"

"WACO"

SCALE LINER BY WALT SCHRODER



AS FEATURED IN THIS MONTH'S EDITION OF AIR TRAILS PICTORIAL

One of the finest all around control line jobs ever to come off a designer's drawing board! Waco-N has already won two beauty events, a precision flying event and has publicly demonstrated its ability to perform all aerobatics and flight maneuvers necessary to win any stunt flying contest. Original model developed, built, pre-tested and flight-tested by Ray O'Neill —a perfect model of a great plane.

KIT COMPLETE WITH EAGLE'S FAMOUS "FLIGHT-CONTROLLER"

Pre-formed landing gear, all hardware, "job-selected" wood, cut, ready-to-assemble wheel pants, die cut plywood sections, 2" and 2½" streamlite wheels, liquids, complete decals. DELUXE KIT CONTAINS all the above, plus fully completed aluminum cowl, hinged, ready to fasten to firewall.

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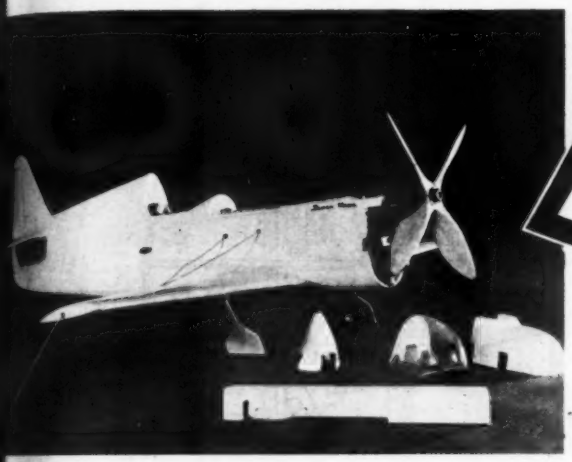
by BRUCE WENNERSTROM

Here is a controlliner that is full of tricks which not only aid performance but add to beauty as well



BLACK MAGIC

THE *Black Magic* opens up a new phase in control line flying. It uses a *strong* retractable gear operated by *one* line only, flaps, and J.A.T.O. (jet assisted takeoff). Motor control may also be used.

The *Black Magic* is the author's dream ship and took almost a year to design and build. It is the closest thing to a real ship we know of. She can be taxied out, gunned into the air. Once off, a pull on the third line and her wheels snap up. With a B engine, she'll do 80 mph. The flaps drop; that means you have 10 seconds before the engine cuts, so you drop your wheels, slow your engine, and bring your ship down a few inches above the flight strip. The engine cuts and she's down.

To get her into the air with a high pitch prop we used a jet unit under each wing mounted like auxiliary gas tanks. These were dropped automatically when the wheels were retracted, the third line working both. While spectacular to see, they were however only halfway successful and we can't recommend their use without further tests.

The *Black Magic* so far has beaten every ship it has been flown against both in beauty and speed, while we have been in the service. Its design is sound both structurally and aerodynamically. The wide tread, short landing gear assures good takeoff characteristics, while the general aerodynamic setup makes for speed and easy handling. The spar, landing gear, and engine mounts are all in one piece for strength. For a fast stable airfoil we used one suggested by Frank Green; Davis ordinates for the upper surface, N.A.C.A. symmetrical for the lower.

Scale up the plans and let's start to work.

FUSELAGE—The fuselage is of conventional crutch construction. The crutch is 1/8" x 1/2" pine or bass, all formers are 1/8" sheet balsa. The nose is cut from a solid block. From former D forward the fuselage is planked; from D to F it is 1/8" square stringer construction.

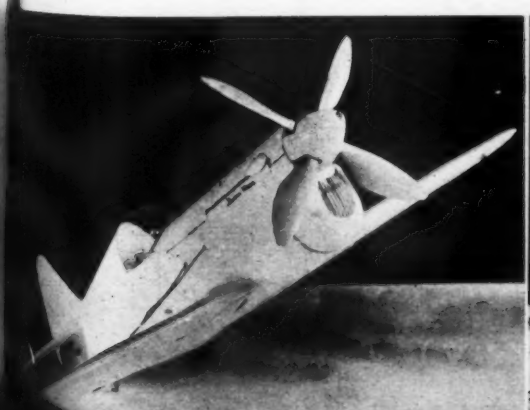
When the fuselage has been planked cut out the cockpit and wing openings. The cockpit cover is formed from celluloid by the Cellomold process. Small tabs are left on either side when the celluloid is trimmed and these are inserted in corresponding slots in the edge of the cockpit. A duplicate instrument panel and headrest are cemented to the bubble to keep it in shape. The controls are added after finishing. The control plate is cut from 1/16" aluminum sheet, the control rod is 3/16" diameter tubing flattened at the ends.

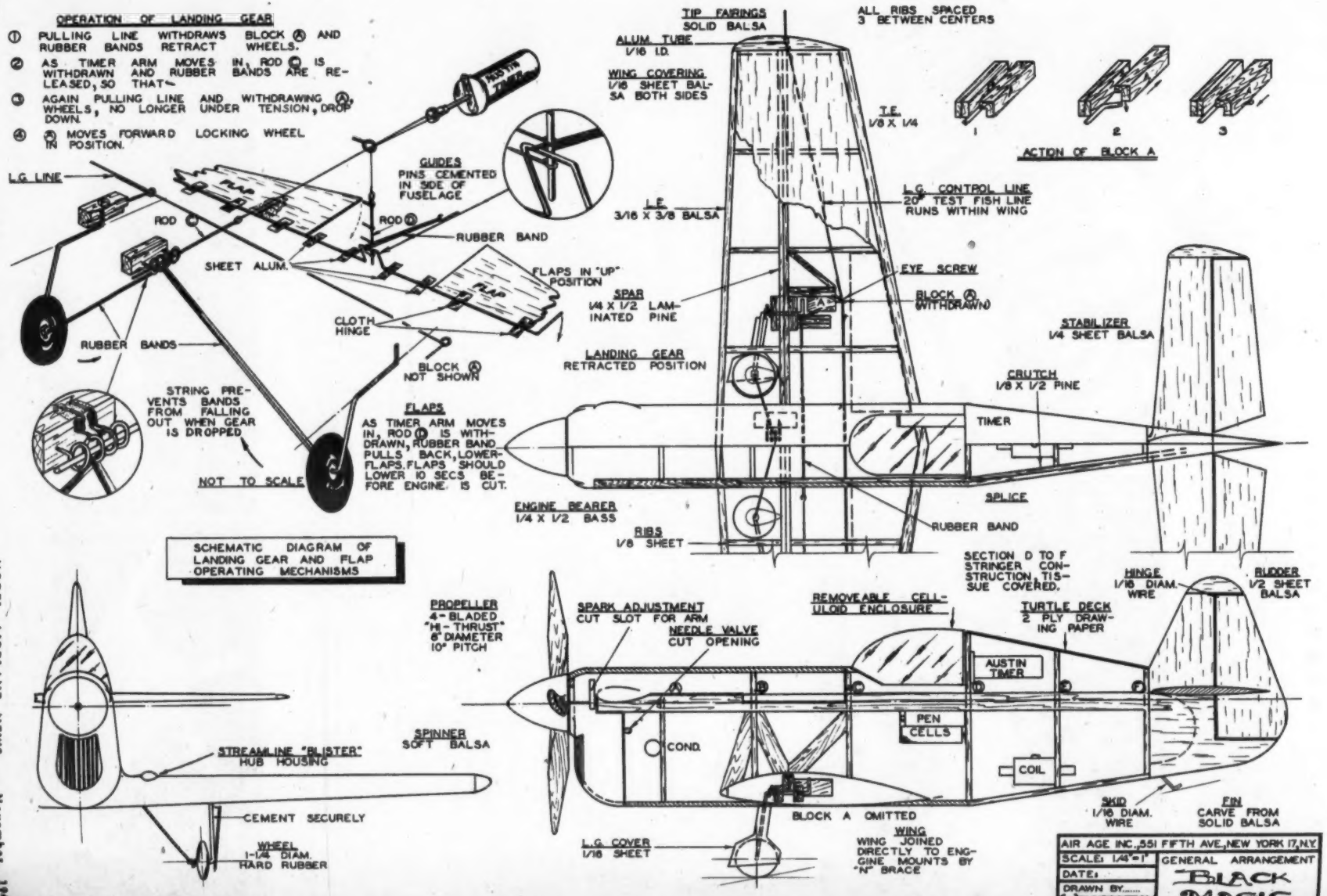
Note that the wing spar is joined directly to the motor bearers by an N truss. The firewall (not shown) should be located according to the engine used. It should be as far forward as possible. The control plate should be mounted over the c.g. which is on the spar.

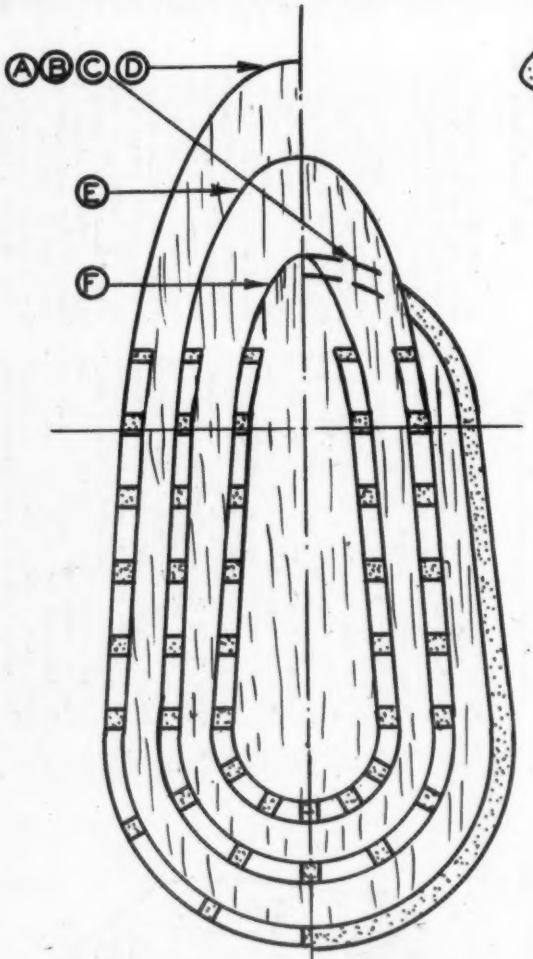
LANDING GEAR—The *Black Magic* is, we believe, the first U-Control model to be equipped with an absolutely dependable retractable landing gear that is as strong as the conventional type. We realize our diagrams are far from self-explanatory so we shall try to dispel the darkness with a thousand words in lieu of a better picture. We shall use in our discussion the series of pictures depicting the action of block A.

In the first picture the wheel is in the extended position. As can be seen, the wheel strut is bent so that the upper portion controls the position of the wheel. In the first figure the wheel is down. It can not come up because block A is preventing it. There is a similar arrangement for the other wheel. Both blocks A are attached to the third line (see schematic diagram). Furthermore, at this

(*Turn to page* 55)

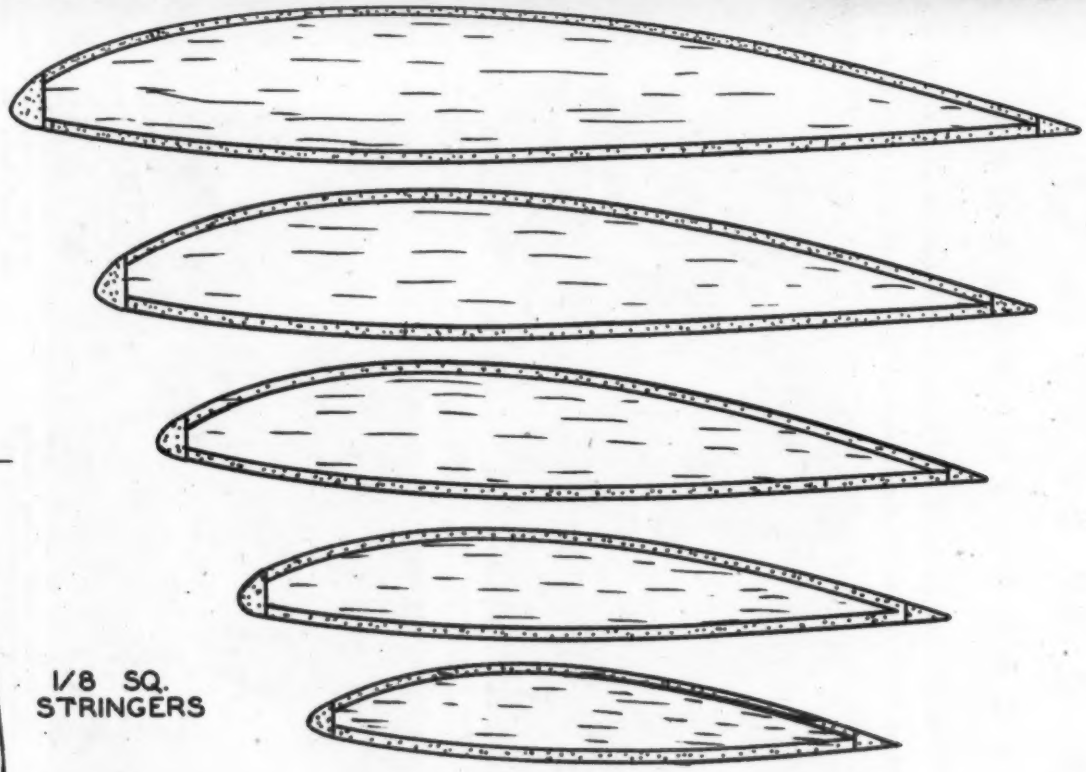



OPERATION OF LANDING GEAR
① PULLING LINE WITHDRAWS BLOCK Ⓐ AND RUBBER BANDS RETRACT WHEELS.
② AS TIMER ARM MOVES IN, ROD Ⓒ IS WITHDRAWN AND RUBBER BANDS ARE RELEASED, SO THAT—
③ AGAIN PULLING LINE AND WITHDRAWING Ⓐ, WHEELS, NO LONGER UNDER TENSION, DROP DOWN.
④ Ⓐ MOVES FORWARD LOCKING WHEEL IN POSITION.
L.G. LINE
ROD Ⓒ
ROD Ⓓ
GUIDES PINS CEMENTED IN SIDE OF FUSELAGE
RUBBER BAND
SHEET ALUM.
FLAPS IN "UP" POSITION
CLOTH HINGE
RUBBER BANDS
BLOCK Ⓐ NOT SHOWN
STRING PREVENTS BANDS FROM FALLING OUT WHEN GEAR IS DROPPED
NOT TO SCALE
FLAPS
AS TIMER ARM MOVES IN, ROD Ⓓ IS WITHDRAWN, RUBBER BAND PULLS BACK, LOWER FLAPS. FLAPS SHOULD LOWER 10 SECS BEFORE ENGINE IS CUT.
SCHEMATIC DIAGRAM OF LANDING GEAR AND FLAP OPERATING MECHANISMS
TIP FAIRINGS SOLID BALSA
ALUM. TUBE 1/16 I.D.
WING COVERING 1/16 SHEET BALSA BOTH SIDES
T.E. 1/8 X 1/4
L.E. 3/16 X 3/8 BALSA
SPAR 1/4 X 1/2 LAMINATED PINE
LANDING GEAR RETRACTED POSITION
ENGINE BEARER 1/4 X 1/2 BASS
RIBS 1/8 SHEET
ALL RIBS SPACED 3 BETWEEN CENTERS
1
2
3
ACTION OF BLOCK A
L.G. CONTROL LINE 20# TEST FISH LINE RUNS WITHIN WING
EYE SCREW
BLOCK Ⓐ WITHDRAWN
STABILIZER 1/4 SHEET BALSA
CRUTCH 1/8 X 1/2 PINE
TIMER
SPLICE
RUBBER BAND
SECTION D TO F STRINGER CONSTRUCTION, TISSUE COVERED.
HINGE 1/16 DIAM. WIRE
RUDDER 1/2 SHEET BALSA
PROPELLER 4-BLADED "HI-THRUST" 6" DIAMETER 10" PITCH
SPARK ADJUSTMENT CUT SLOT FOR ARM
NEEDLE VALVE CUT OPENING
REMOVEABLE CELLULOID ENCLOSURE
TURTLE DECK 2 PLY DRAWING PAPER
AUSTIN TIMER
PEN CELLS
COIL
COND.
SPINNER SOFT BALSA
STREAMLINE "BLISTER" HUB HOUSING
CEMENT SECURELY
WHEEL 1-1/4 DIAM. HARD RUBBER
BLOCK A OMITTED
L.G. COVER 1/16 SHEET
WING WING JOINED DIRECTLY TO ENGINE MOUNTS BY "N" BRACE
SKID 1/16 DIAM. WIRE
FIN CARVE FROM SOLID BALSA
AIR AGE INC., 551 FIFTH AVE., NEW YORK 17, N.Y.
SCALE: 1/4"=1"
GENERAL ARRANGEMENT
DATE:
DRAWN BY.....
BLACK MAGIC

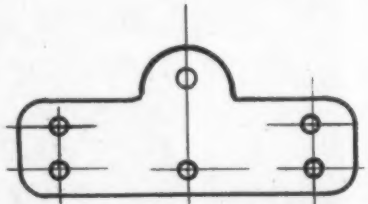


FUSELAGE SECTIONS
1/8 SHEET BALSA

1/8 SQ.
STRINGERS



WING RIBS
1/8 SHEET BALSA



CONTROL PLATE

AIR AGE INC., 551 FIFTH AVE., NEW YORK 17, N.Y.	
SCALE: 1"=1"	RIBS & BULKHEADS
DATE:	BLACK MAGIC
DRAWN BY..... WENNERSTROM	

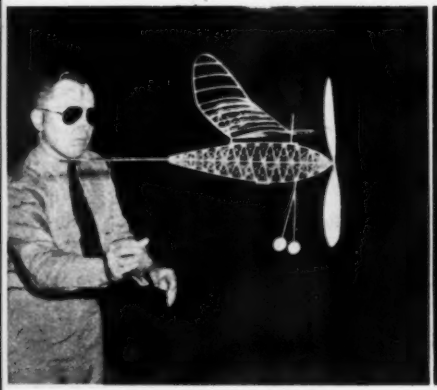
NATIONALS!

Here is the story of the 1946 Nationals held in Wichita, Kansas, over the Labor Day weekend and attended by 1000 enthusiastic contestants from all over the country

Don White of St. Louis chats with H. G. McEntee, editor of MODEL AIRPLANE NEWS

Henry Dore, Director Jim McClelland and Leonard Baer during processing of Baer's model

Lew Mahieu receiving crackup remains from official retrievers of the R.O.W. event



Stan Stanwick launches his prize winning microfilm cabin job

J. W. Beck having several microfilm models processed for the indoor events

Jim Walker, Irv Polk, Irwin Ohlsson, Harry Rice (radio control ship in foreground)

Nothing seemed to disturb genial Al Hummel, Meet manager

NEITHER rain,, nor wind, nor motor trouble, nor snapping rubber could prevent almost 1,000 entrants gathered at Wichita, Kansas, for the 15th National Championship Model Airplane Contest from completing flights in 23 indoor and outdoor events.

And when the shouting was over, when the last results had been tabulated, top place flyer and America's 1946 champion turned out to be Milton Huguelet, 24, of Chicago, repeating his 1938 victory and the only modeler ever to hold the title of "National Champion" more than once.

In club competition, the Cleveland, Ohio, *Balsa Butchers*, whose director is John W. "Red" Hillegas, captured top team honors including the Fred W. Megow trophy, emblematic of club championship, as well as one of the Comet wind tunnels. Runners-up in the group victories were the Portland, Ore., *Gas Hoppers* with 360 points; the Chicago, Ill., *Aeronuts*, 250 points; and the Cleveland, Ohio, *Control Liners*, 235 points. The *Balsa Butchers*, an internationally famous club which includes such stars as Dick Korda, amassed 425 points to win. All four clubs received wind tunnels for experimentation and research presented by Comet Model Airplane & Supply Co.

High point winner in all gas events was Frank Davis, San Diego, Calif., who also walked off with the award for highest time for an individual flight in free flight gas as well as the national novice championship for the "first-time" entrant who placed highest. These victories gave him the Micro-Bilt, Charles Penn, and Berkeley awards, respectively.

High point entrant in the junior classes was 11 year old Davis Slagle, Burbank, Calif., who carried off the Jim Walker control line stunt championship trophy chalking up 102 points, some 16 more than his nearest competitor regardless of age.

Jack Norris, Lakewood, Ohio, took top honors among senior contestants and captured first in control line speed flying, combined classes I & II (AMA rules), with a performance of 77.58 mph.

Jim Walker, Portland, Ore., father of U-Control and long time radio control

Cleveland Balsa Butchers with trophies they won as top place club team

Skippy Pinckney, control line place winner, 9, one of few female entrants

Milt Huguelet, high point Mod winner with some of his trophie

E. Molyneax sleeps soundly as H. Christian and W. Tolhew warm up their motors

Leon Shulman and Irv Levy work feverishly on Shulman's balky R.O.W. job

John Clemens discusses stunt flying with Davis Slagle, who won the event

H. C. Stone of Minneapolis warms up the Hornet on his control line speedster

Ralph Roof's *Forster 99* Taylorcraft just after it had made a glider pickup

Judge D. W. Johnson of Wichita checks dimensions of a model in flying scale event

expert, repeated his 1941 victory by placing first in the radio control event sponsored by Edward Roberts of Philadelphia. Mr. Walker turned his first place prize money of $100 over to the Academy of Model Aeronautics. C. H. Siegfried of Wichita, Kan., took second.

In the flying scale event, 1941 National champ Henry Struck of Old Lyme, Conn., flew his Stinson L-5 to victory with a total of 77.6 points. A new national record of 392.7 seconds for rise-off-water gas powered models was established by Ted Gillette, Hollywood, Calif.

California entrants demonstrated their skill at both control line stunt and speed flying with young Slagle winning the stunt championship and C. E. Wallick, Long Beach, setting the highest time of the meet with 116.12 mph, flown with the Cleveland fork-type or "oarlock" anti-whipping pylon approved by the A.M.A.

The Nationals, first held since the start of World War II, was a 4-day affair and required four separate flying sites to handle all the activity. Indoor events were flown in the Wichita Forum, an auditorium with a 56-foot high ceiling, on Friday, August 30. On the same day outdoor rise-off-water (ROW) gas events were conducted at Crestview Lake, and control line competition got underway at the spacious concrete-surfaced Boeing mile-long parking ramp. Sunday, Monday and Tuesday, August 31, September 1 and 2, saw control line flying continue and free flight gas events run off at Rawdon Airport. In addition to the contest events, the National meet included a convention of A.M.A. members who met in almost continuous sessions. Special gatherings were held for A.M.A. contest board members, nominating and honors committees, air education and model aviation writers groups. None of these affairs broke up before 3 a.m. on any morning!

More than 550 awards were presented to winning contestants on the evening of September 2 in the Wichita Forum. These included scores of famous perpetual trophies, almost 100 permanent trophy prizes, and innumerable motor and other

(*Turn to page 22*)

Jim McClelland, Contest Director, was the calmest person seen at the Meet

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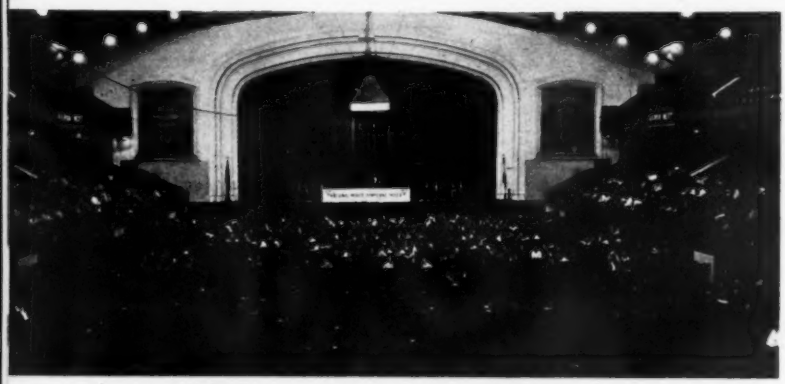
Little Davis Slagle, Burbank, won trophies bigger than himself



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C. H. Siegfried leans over his radio control plane. Contestant P. Helpinstine at right and Judge "June" Pierce rear left

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Among the key leaders largely responsible for the success of the competition were Leo Rutledge and C. O. Wright, associate contest directors; John Downing, chief timer; Carl "Bunch" Davis, chief processor; Lee Lewis, chief marshal; and the following individuals who were chief judges in charge of various phases of the competition: A. L. Lawbaugh, W. G. Simmonds, Kenneth Crandell, Clarence Wallace, Eldon Wahl, A. F. "June" Pierce, Bill Downey, C. E. Pierce, W. H. Gray, and Jack Chastain. About the only person who did not cooperate was the weather man who plagued the contestants alternately with high winds, rains, or freak calm periods during which any model would fly for what seemed hours.

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(*Turn to page* 91)

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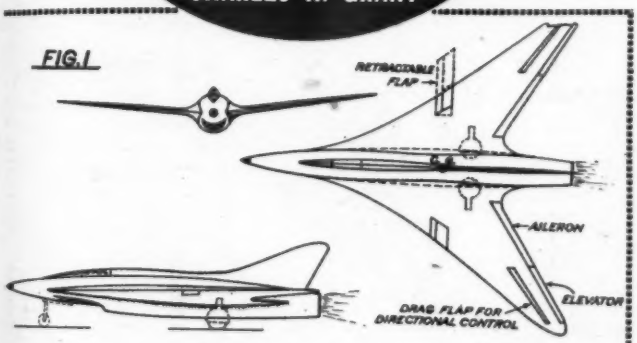
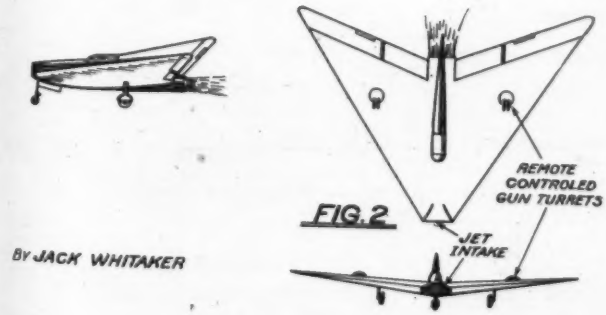


-SONIC PLANE-
By JAMES HARTMAN



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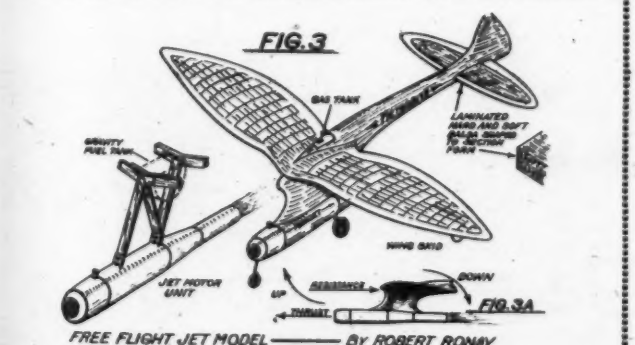

FREE FLIGHT JET MODEL ——— By ROBERT RONAY

THE velocity of sound in air, approximately 750 mph, has had a profound effect on the design of airplanes. From zero to 750 mph air acts as an elastic medium upon bodies moving through it. As such bodies increase their speed this elastic effect diminishes until it becomes zero when bodies or airplanes speed through the air at the velocity of sound. At this point air reacts much as soft cheese. At much higher velocities, 1000 mph or more, airplanes in effect bore their way through the air like a bullet through a board. In the past all aerodynamic laws and formulae were based upon the conception of air as an elastic body. As the speed of airplanes approaches that of sound these formulae become less accurate until, when we think in terms of 1000 mph our whole design formulae must be discarded in favor of ballistics formulae. At such speeds airplanes actually are winged bullets.

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For sonic speed flight, wings therefore should have their maximum thickness far to the rear. Their cross-section can even take the form of a bullet split from nose to rear. These sonic speeds create a tremendous pounding effect on the leading edges of ordinary straight wings and it has been found that wing leading edges must be swept backward at considerable angle so that they knife their way through the air. This is a comparatively recent discovery.

Only three years ago the first sonic speed aerial torpedo with sharply sweptback trailing edges was presented for development at Wright Field. Before that time the usefulness of this feature was not appreciated. A supersonic plane must have smooth contours to the highest degree with no protusions that might cause drag.

Stability is not as great a problem as in slower speed aircraft. If the methods commonly used to stabilize ordinary aircraft are used on sonic speed planes they will be out of flight balance more than they are in. It is common in slow speed planes to put the center of gravity a considerable distance below the center of lift; for instance, the thrust is often above or below the c.g., the center of side area may be above or below the c.g. without disastrous effects. However, on sonic speed craft such arrangements will prove fatal because their effect is magnified many times, approximately as the square of the speed.

The most efficient and stable designs for sonic speed airplanes will have the c.g., the c.l., the center of lateral area and the thrust line approximately on the same horizontal plane. There can be some deviation from this general rule at lower sonic speeds; for instance, the c.l. can be slightly above the c.g., the thrust line can be slightly below it, but distances between these factors must be less than in the common airplane if your sonic speed ship is not to be an erratic flier.

With these factors in mind let us examine the design for a sonic plane submitted by James Hartman of Elmira, N.Y. (Fig. 1). This is one of the best designs we have seen anywhere. It takes into account many features that the average person would overlook.

To reduce drag to a minimum and provide smooth clean lines, Mr. Hartman has chosen the tailless variety of plane. It is composed solely of a fuselage, a set of sharply sweptback wings and a fin. You will note that the shape of the fuselage resembles a bullet which is correct for sonic speeds. Its maximum thickness is rearward of its center. The retreating or sweptback leading edges reduce compressibility (the effect of air above the speed of sound) to a minimum. From the standpoint of low drag this airplane cannot be improved upon.

Of next importance is stability. Such a plane must not only be stable at sonic speeds but must also be stable at landing speeds for there is no value in flying a plane at 700 mph or more if it cannot be landed safely. Safe landing speeds for such craft are below 100 mph, and if eventually this type of plane is to be used by the general public it must land below 50 mph. At sonic speed planes have a general tendency to hold their course and to strongly resist any disturbing

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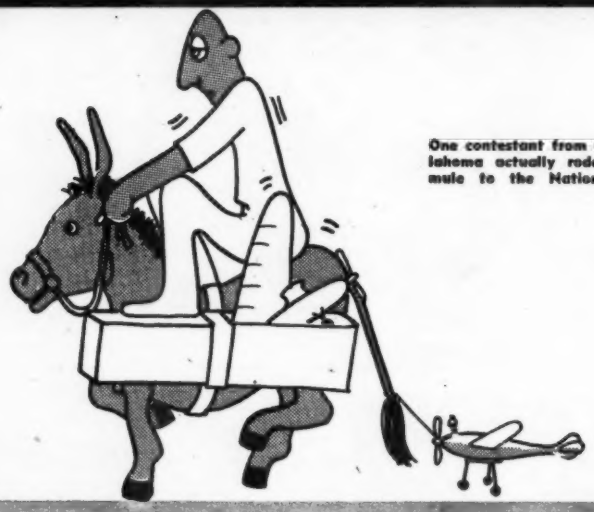

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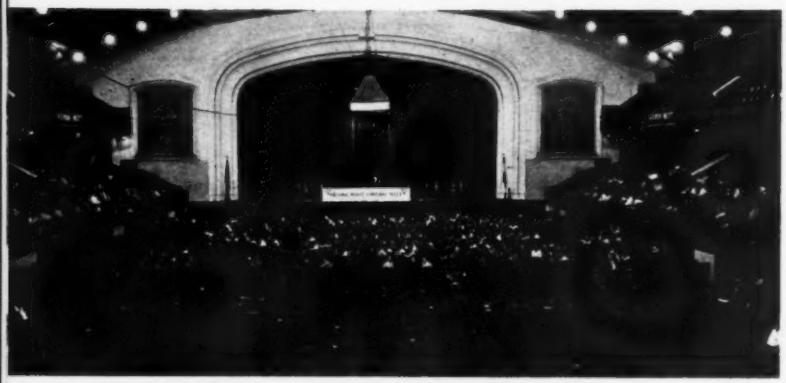

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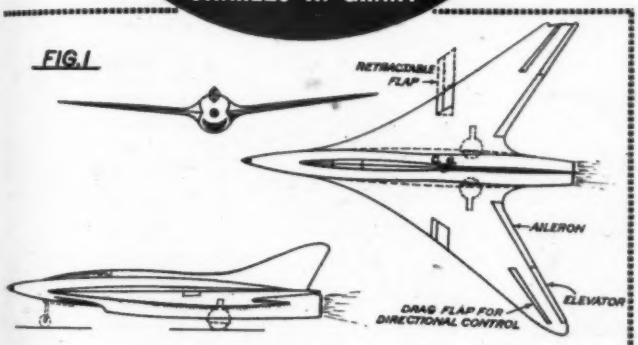

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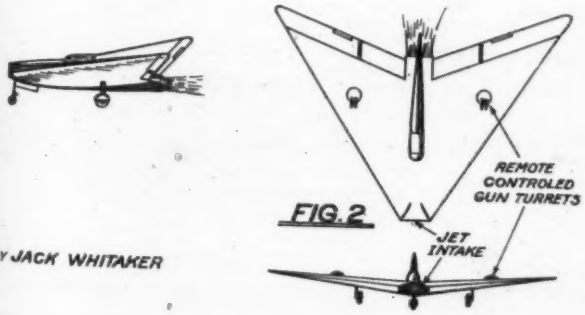
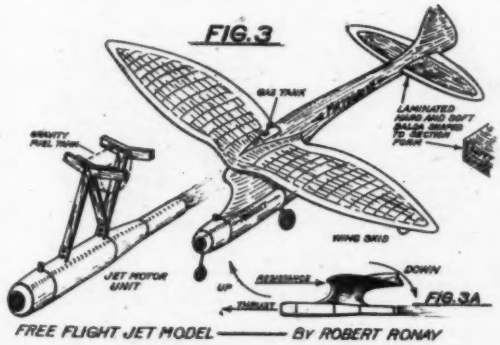


FIG. 2

By JACK WHITAKER



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NORTHROP XB-35

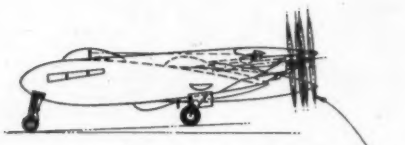
—FLYING WING—

DRAWN BY—
A.V. SIGNORELLI

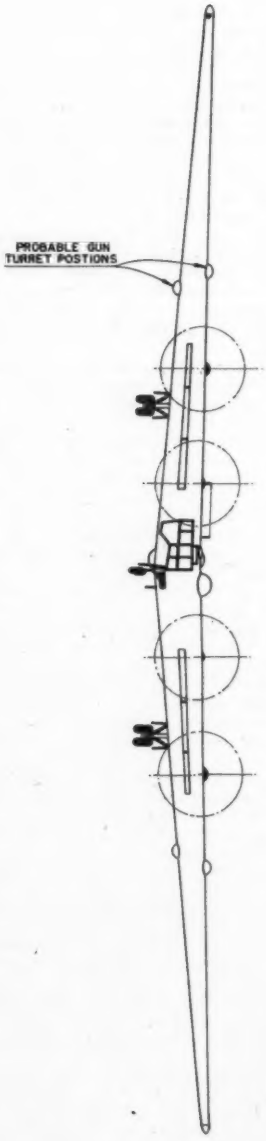
—DATA—

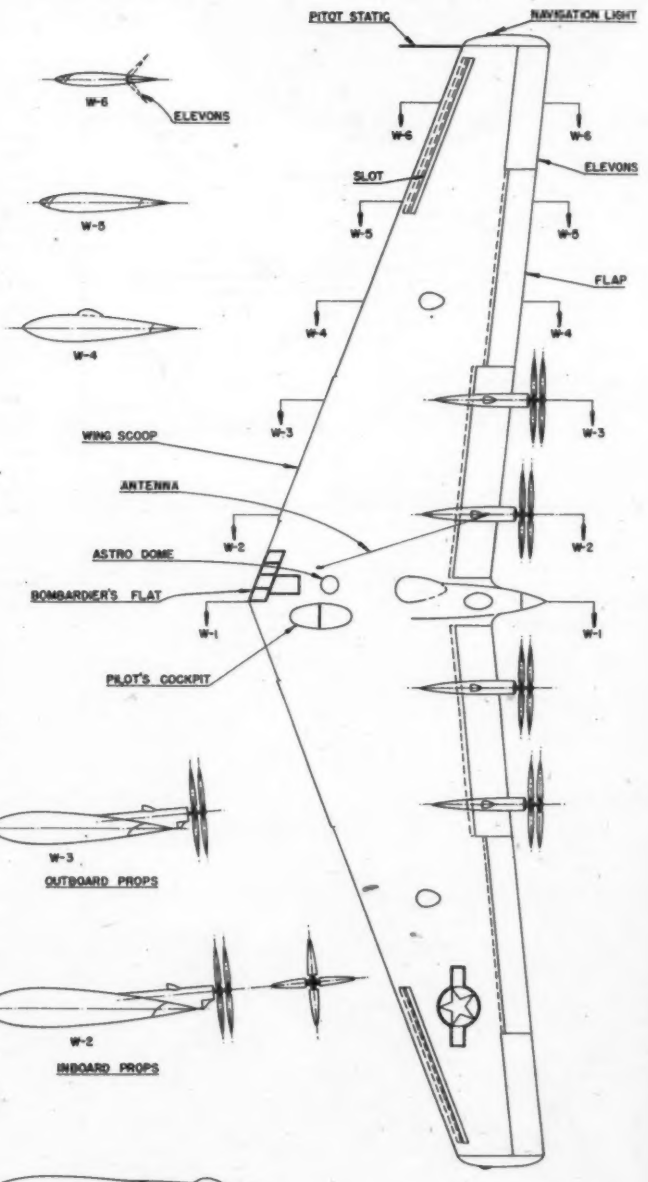
WING SPAN	172 FT.
GROSS WEIGHT	104 TONS
ENGINES	4-P&W WASP MAJOR
	(3000 HP ea. TURBO-SUPERCH'D)

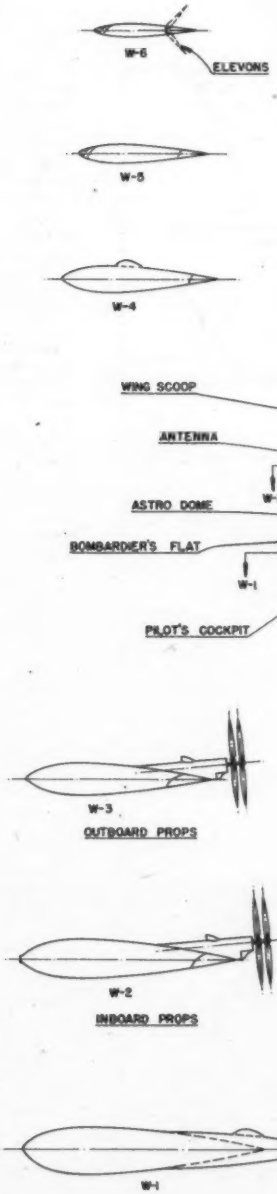
ELEVONS ARE USED TO TAKE THE PLACE OF THE ELEVATORS AND THE AILERONS — AID IN TURNING —



NOTE:-
PLANS DRAWN FROM PHOTOS- PROTOTYPE DRAWINGS RESTRICTED





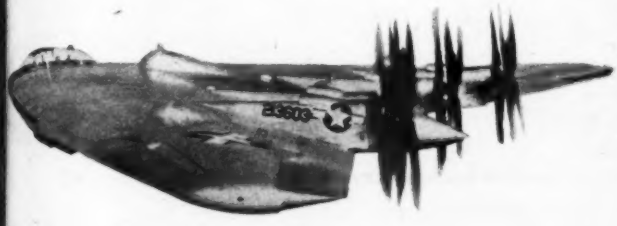


PLANE ON THE COVER

by ROBERT McLARREN

Northrop X-B-35

Read here the many problems of flying wing design and how they were overcome in this bomber



"THE story of Northrop cannot be told—yet. But when it is related in its entirety one of aviation's most important chapters, ranking closely in importance with the epics of Lilienthal and his airfoil, the Wright Brothers and powered flight, Glen Curtiss and the aileron, will have been recorded for future generations in the Air Age." These words were contained in MODEL AIRPLANE NEWS, October 1944 issue.

Now, two years later, the world has learned of the Northrop *Flying Wing* and now the "story of Northrop" can be told in its entirety. But it is a story, the telling of which will continue for many years to come for assuredly the development of a practical true flying wing promises a profound influence on aircraft design throughout the world.

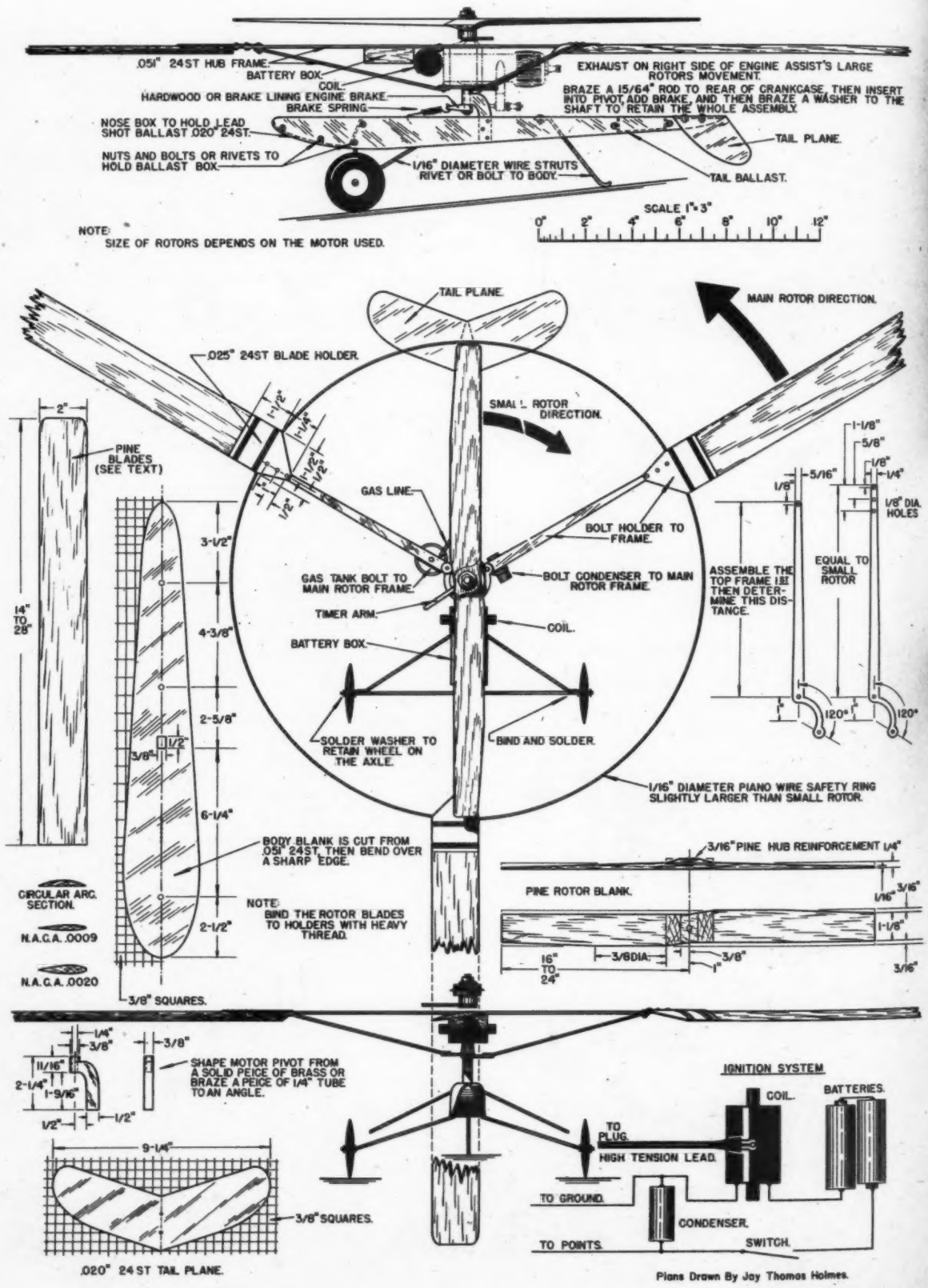
Why a flying wing? Opponents of such a configuration have asked that question for years and have quarreled with its answer. They can point out dozens of undeniable shortcomings of such a design and can easily prove that a flying wing is an incredibly difficult engineering problem, considerably more complex than the design of a conventional aircraft. They can point to nearly 50 years of failure in the history of the flying wing.

But John K. Northrop just as readily points to four significant advantages of the flying wing over its conventional competitors: (1) it carries 25% more useful load; (2) it has 25% greater range; (3) it has a top speed 20% greater; (4) it costs 20% less to build.

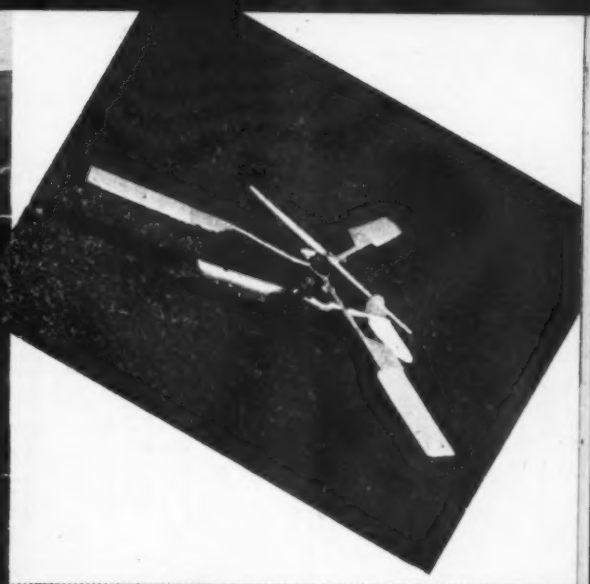
Northrop and other flying wing advocates are willing to grant many concessions to conventional designs all centering largely in the overall superior stability of the conventional airplane as compared to a conventional flying wing. But Northrop's particular contribution to aeronautics lies in his creation of an *unconventional* flying wing. Here are some of the ways he solved the problems.

(*Turn to page* 42)

These four views give a good idea of the appearance of this unconventional craft both on the ground and in the air. The unusual design is especially striking in the side view (second above) where absence of a fuselage and tail is very noticeable



Plans Drawn By Jay Thomas Holmes.



GASSIE HELICOPTER

by LEONARD MUELLER

Experiments with this and other models led to the development of full size helicopter at top of page

THE writer honestly believes that much can be learned and the science of helicopter aerodynamics advanced considerably through the use of models. Both Young and Hiller, who rank among America's outstanding designers, used models in their developmental work and most of us marvel at their achievements. Should the helicopter bug infect some of our thousands of ingenious model fans with their inventive talent, I am certain the day of the safe low-priced flivver of the air will arrive sooner than anticipated at present.

The information advanced in this article should assist some of the designers of pint-sized aircraft in the construction of models giving encouraging performance and some really useful developments may appear.

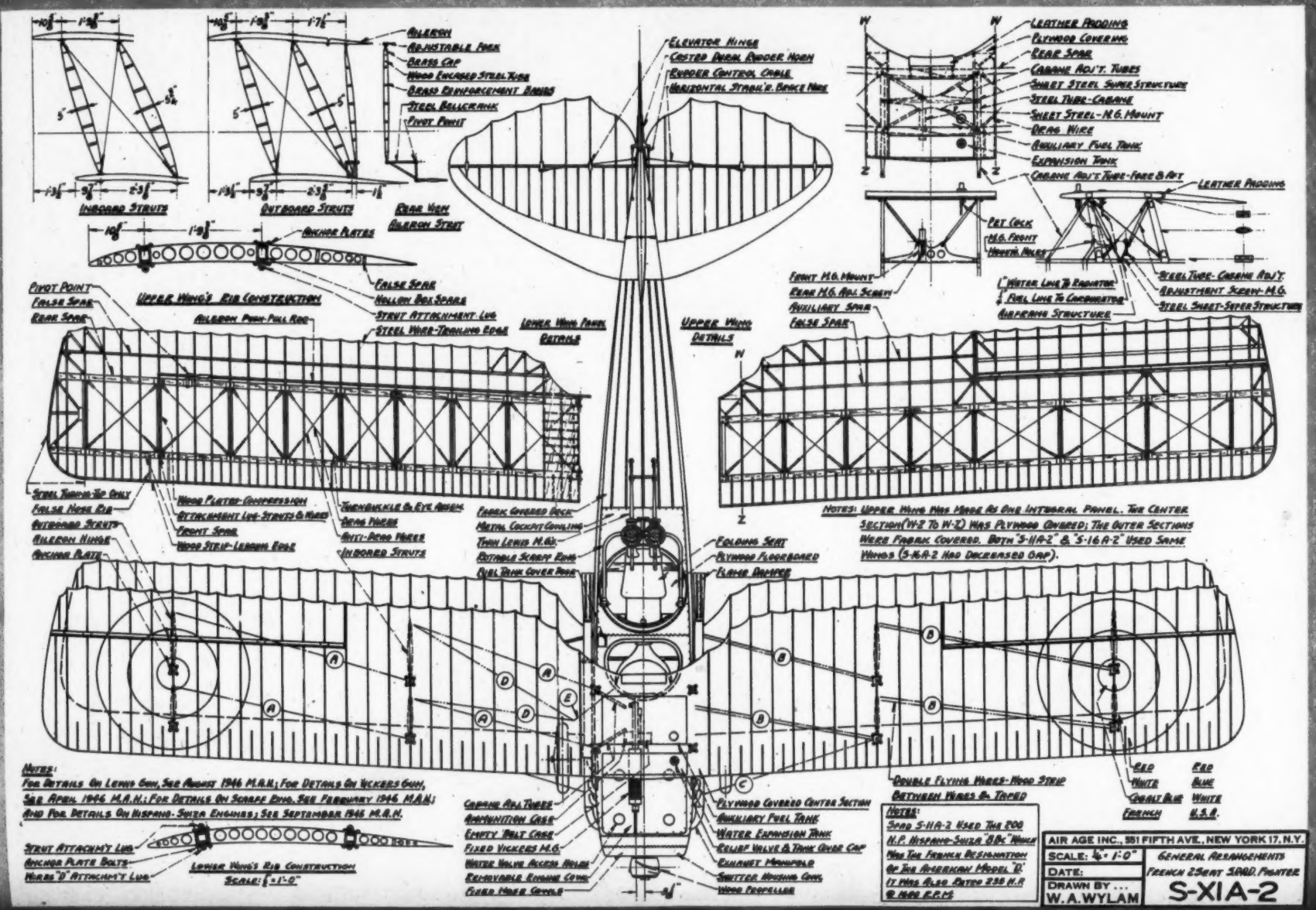
HELICOPTER DESIGN—Torque, the mighty but invisible arm of reaction, is our first problem. The tail rotor at the end of a long moment arm is one answer and in some instances jet reaction and flettner rotors have been used in a similar manner. Rotors revolving in opposite directions have been accepted by many others as the better answer. These have been mounted one above the other, some geared to intermesh, some mounted at the ends of horizontal pylons and others at forward and aft fuselage. Placing the propulsive force in the blades themselves is the third method of combating this problem at the present time.

All have their merits and drawbacks. We know that action and reaction are equal and opposite, and should we bolt our engine to the ship and develop enough thrust to begin to lift the plane from the ground with a single rotor, the fuselage will whirl merrily around in a direction opposite that of the rotor.

In this model the engine is not bolted to the fuselage but is mounted on a shaft and is free to spin in either direction. By attaching blades to the engine we can utilize this reaction without too much loss of energy and without building an elaborate transmission or extension shafting. On a man-carrying ship it also eliminates the clutch free wheeling unit and most of the cooling problems, and at the same time increases gyroscopic stability.

ROTOR DESIGN—As seen on the drawings one rotor turns opposite and is mounted above the other. To eliminate gearing and still get high horsepower output from the engine we must sacrifice some thrust and mount a comparatively small rotor on the crankshaft. This rotor attaches to the crankshaft as would a conventional prop but is much larger and of very low pitch. Straight grained pine has several advantages over other materials for this two bladed rotor. It is easily obtainable, can be worked satisfactorily, and fails under average impact. The latter is important for both the engine and parts of

(*Turn to page 77*)


INBOARD STRUTS
OUTBOARD STRUTS
REAR VIEW AILERON STRUT
ANCHOR PLATES
FALSE SPAR
HOLLOW BOX SPARS
STRUT ATTACHMENT LUG
STEEL WIRE-TROILING EDGE
PIVOT POINT
FALSE SPAR
REAR SPAR
UPPER WING'S RIB CONSTRUCTION
AILERON PUSH-PULL ROD
LOWER WING PANEL DETAILS
STEEL TURN-UP ONLY
FALSE NOSE RIB
OUTBOARD STRUTS
AILERON HINGE
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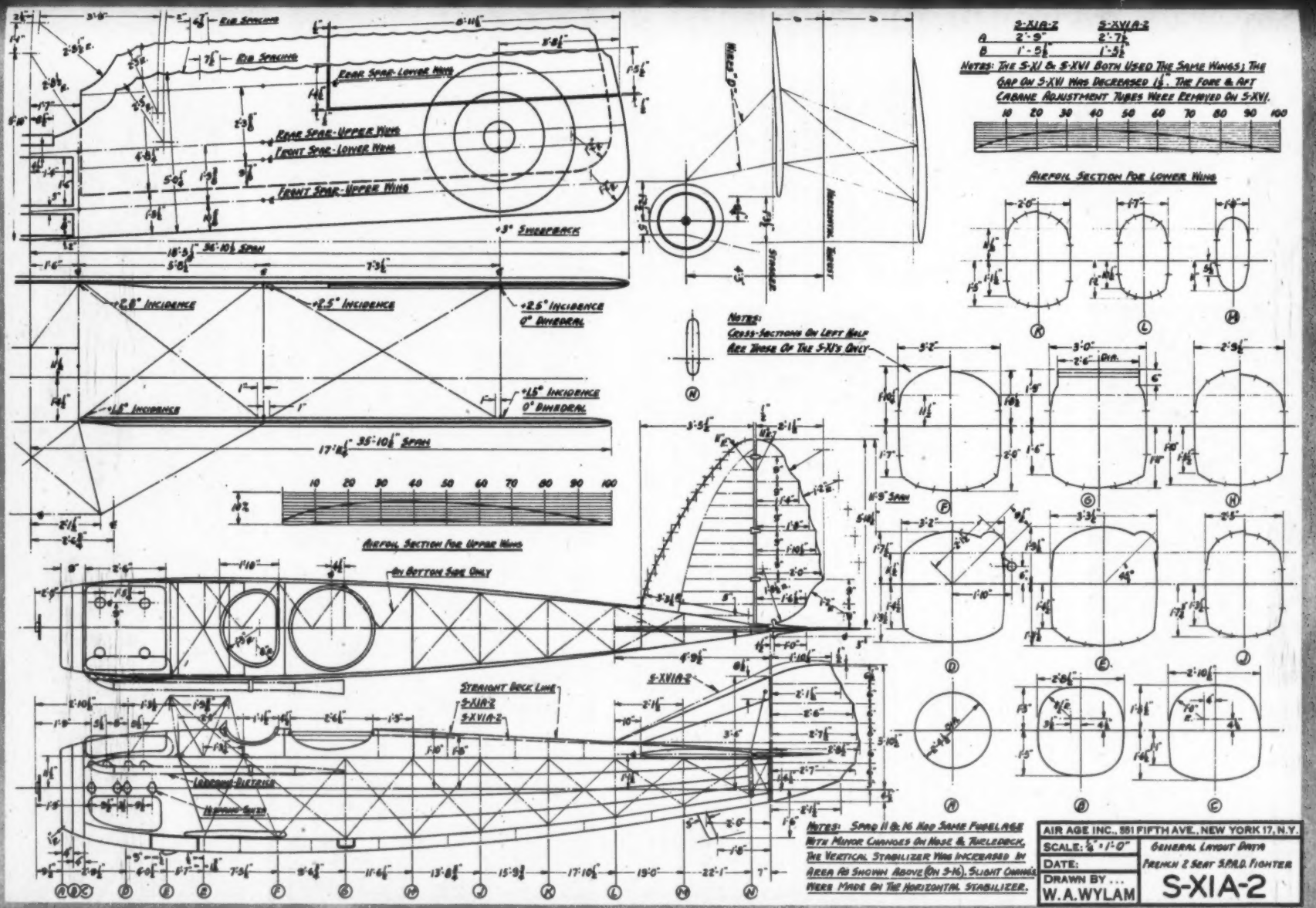
WOOD PLATES-COMPRESSION
ATTACHMENT LUG-STRUTS & WIRES
FRONT SPAR
WOOD STRIP-LEADING EDGE
TURNBUCKLE & EYE ASSEM.
BRACE WIRES
ANTI-DRAG WIRES
INBOARD STRUTS
ELEVATOR HINGE
CENTER BREAK RUDDER HORN
RUDDER CONTROL CABLE
HORIZONTAL STAB'R. BRACE WIRE
FABRIC COVERED DECK
METAL COCKPIT COWLING
TWIN LEWIS M.G.S
DETACHABLE SCARFF RING
FUEL TANK COVER PANS
FOLDING SEAT
PLYWOOD FLOORBOARD
FLARE DROPPER
UPPER WING DETAILS
LEATHER PADDING
PLYWOOD COVERING
REAR SPAR
CABANE ADJ'T. TUBES
SHEET STEEL SUPER STRUCTURE
STEEL TUBE-CABANE
SHEET STEEL-M.G. MOUNT
DRAG WIRE
AUXILIARY FUEL TANK
EXPANSION TANK
CABANE ADJ'T. TUBE-FORE & AFT
PET COCK
M.G. FRONT MOUNTS
FRONT M.G. MOUNT
REAR M.G. ADJ. SCREW
AUXILIARY SPAR
FALSE SPAR
("WATER LINE TO RADIATOR
FUEL LINE TO CARBURETTOR
AIRFRAME STRUCTURE
STEEL TUBE-CABANE ADJ'T.
ADJUSTMENT SCREW-M.G.
STEEL SHEET-SUPER STRUCTURE
NOTES: UPPER WING WAS MADE AS ONE INTEGRAL PANEL. THE CENTER SECTION (W-2 TO W-2) WAS PLYWOOD COVERED; THE OUTER SECTIONS WERE FABRIC COVERED. BOTH "S-11A-2" & "S-16A-2" USED SAME WINGS (S-16A-2 HAD DECREASED GAP).
DOUBLE FLYING WIRES-WOOD STRIP BETWEEN WIRES & TAPED
CABANE ADJ. TUBES
AMMUNITION CASE
EMPTY BELT CASE
FIXED VICKERS M.G.
WATER VALVE ACCESS HOLES
REMOVABLE ENGINE COWL
GUARD WIRE COWLS
FLYWOOD COVERED CENTER SECTION
AUXILIARY FUEL TANK
WATER EXPANSION TANK
RELIEF VALVE & TANK COVER CAP
EXHAUST MANIFOLD
SHUTTER HOUSING COWL
WOOD PROPELLER
RED WHITE COBALT BLUE FRENCH
RED BLUE WHITE U.S.A.
NOTES:
SPAD S-11A-2 USED THE 200 H.P. HISPANO-SUIZA "B Bx" WHICH WAS THE FRENCH DESIGNATION OF THE AMERICAN MODEL "D". IT WAS RATED AT 235 H.P. @ 1800 R.P.M.
NOTES:
FOR DETAILS ON LEWIS GUN, SEE AUGUST 1946 M.A.N.; FOR DETAILS ON VICKERS GUN, SEE APRIL 1946 M.A.N.; FOR DETAILS ON SCARFF RING, SEE FEBRUARY 1946 M.A.N.; AND FOR DETAILS ON HISPANO-SUIZA ENGINES, SEE SEPTEMBER 1946 M.A.N.
STRUT ATTACHM'T LUG
ANCHOR PLATE BOLTS
WIRES "D" ATTACHM'T LUG
LOWER WING'S RIB CONSTRUCTION
SCALE: 1"=1'-0"
AIR AGE INC., 551 FIFTH AVE., NEW YORK 17, N.Y.
SCALE: 1/4"=1'-0"
DATE:
DRAWN BY ... W. A. WYLAM
GENERAL ARRANGEMENTS
FRENCH 2 SEAT SPAD. FIGHTER
S-XIA-2



	S-XIA-2	S-XVIA-2
A	2'-9"	2'-7½"
B	1'-5½"	1'-5½"

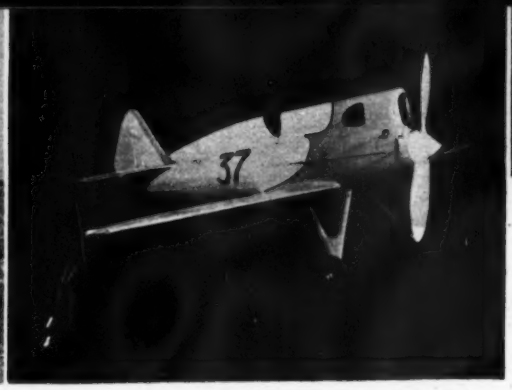
NOTES: THE S-XI & S-XVI BOTH USED THE SAME WINGS; THE GAP ON S-XVI WAS DECREASED 1½". THE FORE & AFT CABANE ADJUSTMENT TUBES WERE REMOVED ON S-XVI.

10 20 30 40 50 60 70 80 90 100

NOTES: SPAD XI & XVI HAD SAME FUSELAGE WITH MINOR CHANGES ON NOSE & TURTLEDECK. THE VERTICAL STABILIZER WAS INCREASED IN AREA AS SHOWN ABOVE (ON S-16). SLIGHT CHANGES WERE MADE ON THE HORIZONTAL STABILIZER.

AIR AGE INC., 551 FIFTH AVE., NEW YORK 17, N.Y.	
SCALE: ⅜" = 1'-0"	GENERAL LAYOUT DATA
DATE:	FRENCH 2 SEAT S.P.A.D. FIGHTER
DRAWN BY ... W. A. WYLAM	S-XIA-2

No. 1 Contest winner from Florence, Italy



No. 2 H. Granger built this *Pete* from plan in M.A.N.

News of mod
menters from

Air

OFFICIAL MEET PHOTOS—As part of our coverage of the Nationals this year we have had a very complete set of photos taken by our official photographer at the event, Ernie Petry. Some of these are printed on pages 20-22 of this issue and there are many more, quite a few of which will he printed in later issues. Anyone wishing copies of these for themselves should write direct to Mr. Petry at 835 Marshall Ave., Webster Groves 19, Mo. as he can supply them direct. We *do not* have extra copies for sale at our offices. Mr. Petry is prepared to supply all you want at a nominal cost. He will also have many that we will not be able to use in the magazine due to lack of space; so if you think your photo was taken by our photographer during the meet, write him to see what is available.

PARTS SOURCES—As the market is still in an unsettled state, we felt that those modelers wishing to experiment with radio control might like a listing of parts now available, descriptions, sources, etc. The article on page 40 of this issue gives such data. We have tried to include only such items as are now obtainable, either in the open market or direct from manufacturers in those cases where the items may not yet be widely distributed.

All the parts available are not included in this article by any long ways. It is intended simply to give the prospective builder a lead along the probable lines of his requirements. Many constructors have their own sources for special parts and we would like to hear of these, and also of their radio control experiments in general.

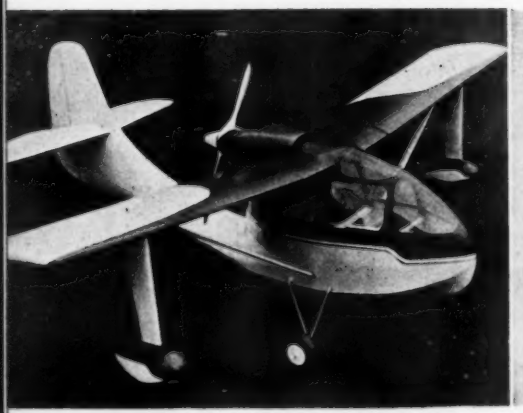
Picture No. 1 shows a fine glider model that won a 1945 local contest at Florence, Italy with a 33 min. out-of-sight performance. Giorgio Bonsi, Vialle dei Mille 90, Florence, editor of the Italian aviation magazine, *L'Ala*, submitted the picture but did not identify the flier.

The excellent photo, No. 2, of his *Pete* racer model was sent in by H. C. Granger, FL, Royal Canadian Air Force, Dartmouth, N.S., Canada. The *Pete* was constructed from plans published in M.A.N.'s Oct. 1945 issue.

The beautifully detailed *Seabee* free flight gas model in No. 3 is the work of Tom Mountjoy, 6904 Wake Forest Drive, College Park, Md. who built his ship from pictures of the real airplane. Of all balsa construction, with balsa sheet covering on the fuselage, Mr. Mountjoy's *Seabee* boasts a 55" wingspread, a weight of 3 lbs., a retractable landing gear for water flight, and it is an excellent flier.

Nelson Proctor, 44 Chestnut Rd., Verona, N.J., gives photography credit to his friend Roy Wagner for No. 4 and we in turn congratulate Nelson for building his accurate *Piper Cub* scale model. Its *Atom* engine delivers plenty of power and the large wingspan a fine glide; a series of good flights was interrupted by only one crackup and this occurred when a fence post interfered with a glide.

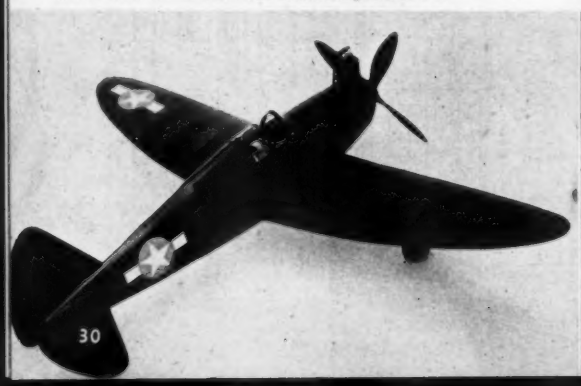
No. 5 is a professional photog's representation of Robert Haines' latest model, a P-47 *Thunderbolt*. A consistent performer, the ship is built on 1"-1' scale and features throttle control by a third line. A *Brown Jr.* supplies the power. Bob put in 200 construction hours during four



No. 3 Free flight Seabee built by Tom Mountjoy

No. 4 *Atom*-powered Cub from Nelson Proctor is exceptional flier

No. 5 Bob Haines built this *Brown Jr.*-powered P47



No. 6 A Cuban model by Robert Grindell uses *Hurricane* 24

plane experi-
the world

Ways

No. 11 E. Wallers' Culver V liner on floats

No. 12 Twin *Arden Fireball* from Dale Bures

months to complete his model and worked hard sanding between coats to achieve a super finish. The top cowl is removable to allow access to the motor ignition. Bob lives at 324 F. 3rd St., Moorestown, N.J.

From Cuba comes No. 6, the contribution of Robert Grindell, P.O. Box 969, Havana. No constructional details are available but we're told that this gas model is a good performer and is powered by a *Hurricane 24*.

An exact scale model of the Navy *Kingfisher* occupies the No. 7 spot in our photo lineup, a worthy representative of Frank Rogers' model building skill submitted by a buddy, Ralph Evans, Box 161, Muroc, Calif. It is a completely solid ship, equipped with a set of movable controls which operate from the stick in the cockpit. Minutely detailed right on down to the pilot's seat, visible in the photo, the *Kingfisher* also contains all other controls and instruments plus a movable canopy, wingtip lights, built-up dummy motor and an exact scale prop. Ralph took this beautiful shot in 1943 on Army time and is pretty certain that Frank Rogers will be pleased as well as surprised to see his model in M.A.N.

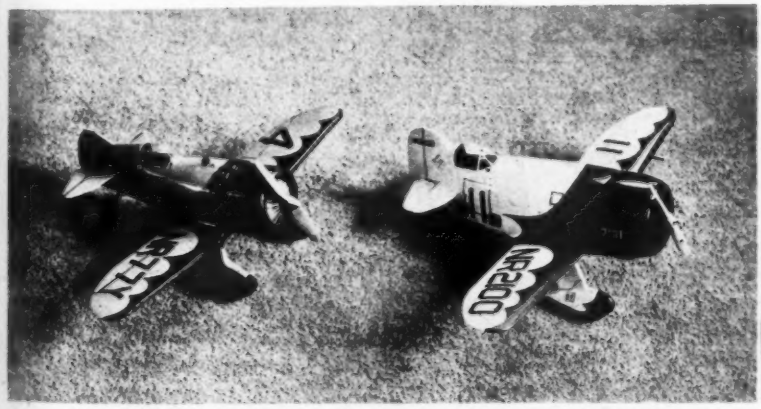
Pictured in No. 8 is the latest brainchild of Jim Rathke, 5243 Highland Ave., Kansas City, Mo., a flying wing with a span of 22". Jim's description: "This is the third improvement of the original design. It has a 45° sweepback and 30° negative incidence at the tips. The original had a continuous stall and dive flight, but this refinement has a smooth, steady flight. It usually covers 150 to 200 feet on a calm day, staying up about 15 seconds."

Photographed together in No. 9 are fine little models of Doolittle and Bayles' *Gee Bee* racers, built by Robert C. Mikesh, 306 Oakwood Ave., Ottumwa, Iowa. Bob points out that two such odd designs together make good display models, and we certainly agree. The yellow and black Bayles job was cast in metal in one piece; the white and red Doolittle *Gee Bee* was then made up to the same scale.

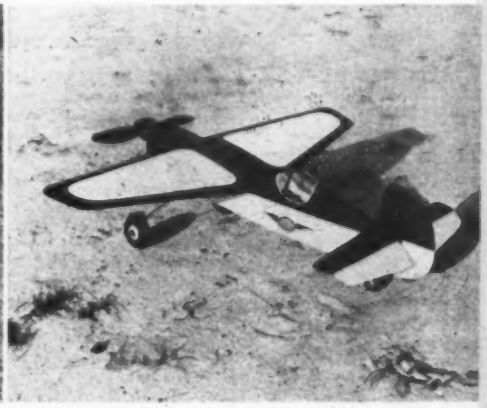
The attractive sport model in No. 10 is the property of Stephen A. Lambert, 367 Gillespie St., Fayetteville, N.C., modeled from Jan. 1945 M.A.N. *Whippersnapper* plans. Construction was started on Okinawa while Stephen was serving with the 940th Air Eng. Sqd. in July 1945 and completed upon his return to the States. Two months' work included the addition of square wing and stabilizer tips and the installation of an inverted *Forster 29* motor. The covering is Japanese silk painted red and cream. An airscoop was necessary since the engine ran hot despite cooling units. The ship is a veteran of many flights, its best time being 50.4 mph, a good record for a sport flyer. Stephen offers his congratulation to Dick Clark, *Whippersnapper* designer, for a model that is "without a doubt the most stable and consistent U-control I have ever flown."

A neat appearance distinguishes the *Culver V* liner, No. 11, of G. Earl Waller of Clarkdale, Ariz., another M.A.N. plan model design, with a wingspan of 32". Lack of a suitable flying field prompted Mr. Waller to construct a pair of floats (redesigned from free flight floats by

(*Turn to page* 67)



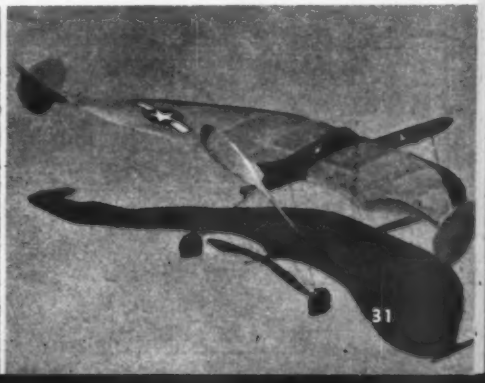
No. 9 *Gee Bee* racers used by Bayles and Doolittle solid-modeled by R. Mikesh



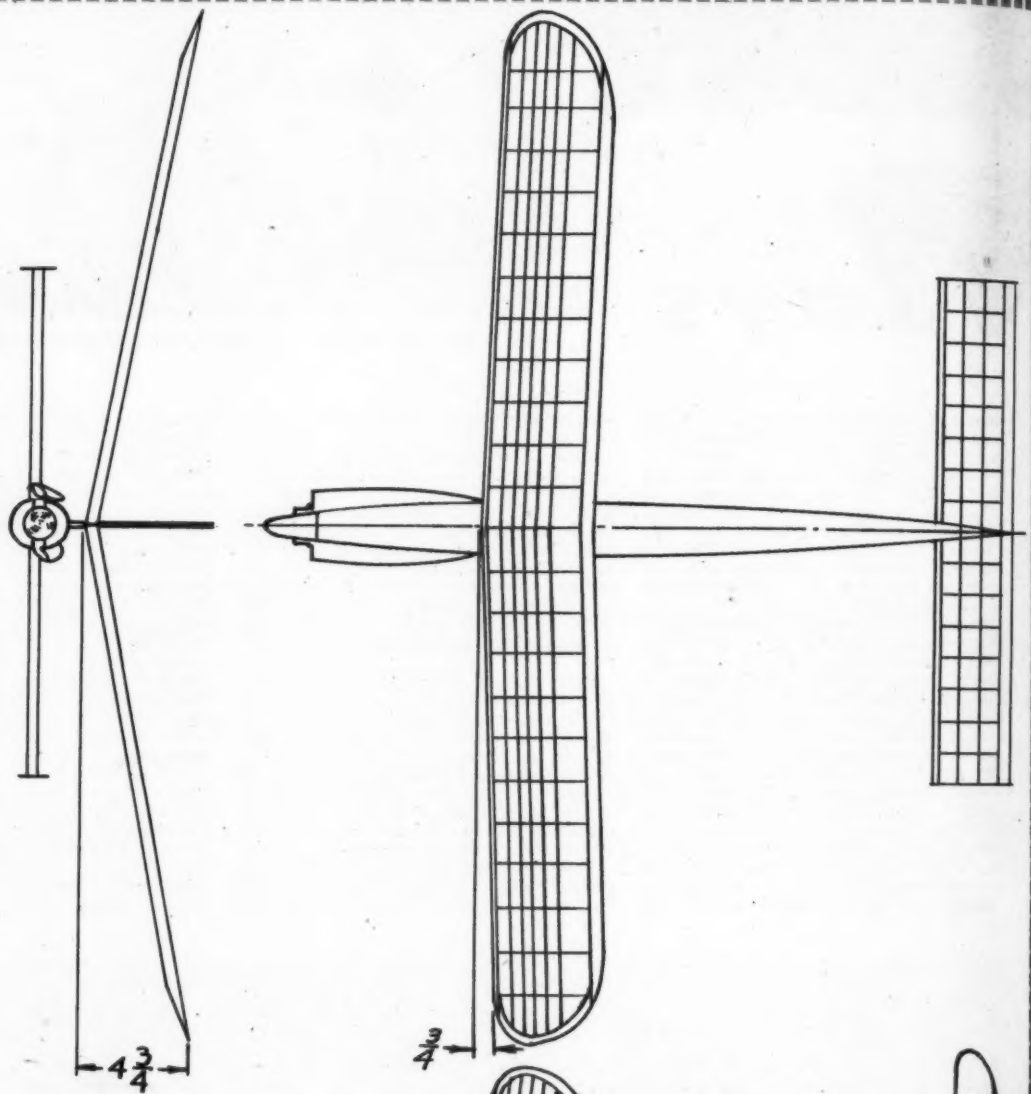
No. 10 S. Lambert built this *Whippersnapper*

No. 7 Beautiful solid *Kingfisher* sent in by Ralph Evans was built by Frank Rogers

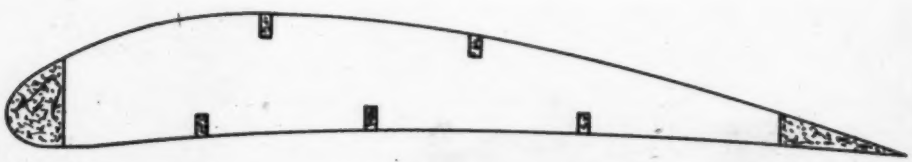
No. 8 Jim Rathkes' successful 22" flying wing



SCALE 8" SIZE



SLICKER "3"
DESIGNED BY DICK EVERETT
DRAWN BY C.W. JOHNSON



WING RIB TEMPLATE
FULL SIZE

by

DICK EVERETT

SLICKER 3

This streamliner with sleek fuselage and folding prop will lead you a merry chase

THE *Slicker* is a plane with a future—sleek, streamlined, with a fast climb and a flat soaring glide. How well we know this! During test flights the ship was chased for miles before finally being retrieved; in her first and second contests she soared out of sight. That in a nutshell is *Slicker*, third in her line, carefully designed and built and characterizing the type of ships you will build for tomorrow's contests.

The *Slicker* can be built easily and quickly. She'll take a lot of beating and still be in there flying with the best. In her you see the byproduct of years of contest experience in which everything happened that could possibly befall a contestant and his model.

The fuselage is hollowed from two blocks (a faster, cleaner way to build), the wing section carefully chosen from a line of high lift, low drag airfoils that were tested at the speeds our models fly, swept back for a nice flat turn and stable flight.

The motor run is approximately 40 seconds—40 seconds of homesick-angel climb. When other ships' short motor runs are over, *Slicker* will still be going up. In the dead calm air of evening, three-minute flights are commonplace.

For those who want a small ship, we recommend scaling down these plans. Your work will be justified.

Before starting to build you will find it a lot easier if you take time out to make a full size drawing as well as full size templates for the outside contour of the fuselage and one for the wing and horizontal tail sections.

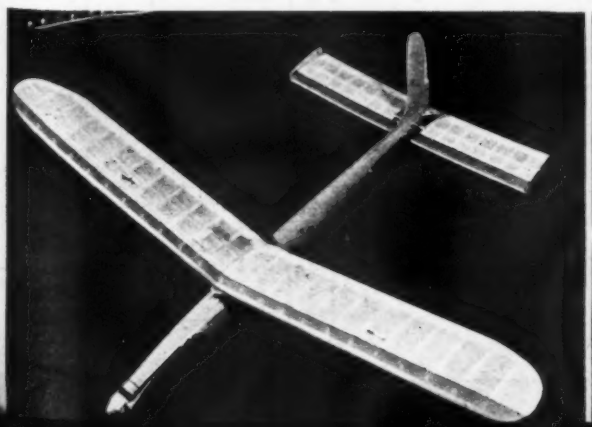
FUSELAGE—Select two good blocks of 6 to 8 lb. balsa which will suit the dimensions of the fuselage. Cement together lightly using strips of paper with a drop of cement on each side of them to "paper glue" the halves together. Allow this to dry, and in the meantime cut out from heavy wrapping paper a top and side view of the fuselage. When the two blocks are dry, cut out top and side view of the fuselage as per the paper templates. Rough in the various sections with a penknife or small plane, then fit each template to its respective position. Fair in between the stations with the abovementioned tools, then sand smooth. Split the blocks apart and hollow out, using a spoon gouge or any tool available until the fuselage has a thickness of 1/16" to 1/8", being thicker at the nose and gradually tapering until it is 1/16" at the tail. The inside surface is then sanded smooth and three coats of clear dope brushed on, sanding between each coat. This will protect the inside from the splashing lube of the rubber motor. Cut the nose bulkhead, which is incidentally the only bulkhead, from 1/8" plywood and cement in place. Then cut the two plastic reinforcement plates from 1/64" celluloid, coat them liberally with cement and press in place. The vertical tail and dorsal fin are very simply constructed from sheet balsa, faired as shown on the drawing and cemented in place on top of the fuselage.

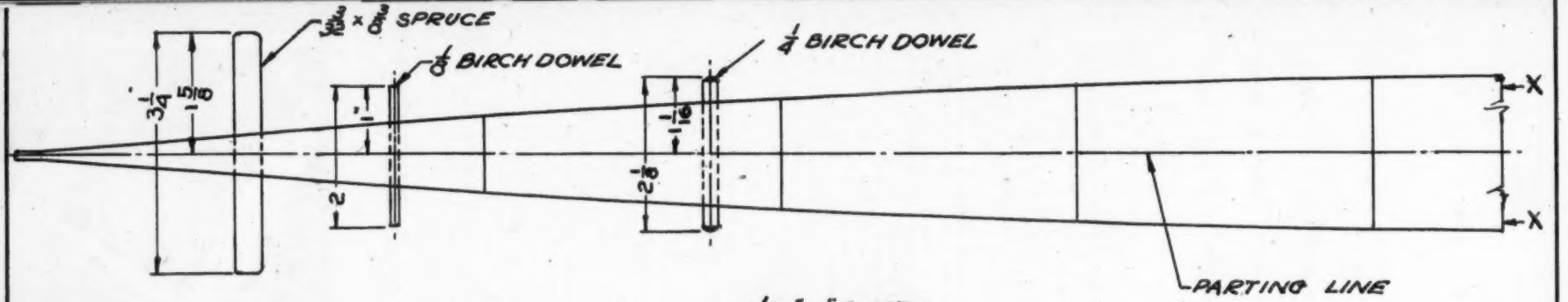
Finish is applied after a very smooth sanding, and two coats of clear dope are followed by two of deep orange, sanding between each coat. The nose block is built up from laminations of 1/4" hard balsa thoroughly cemented together, with a 1/16" hole drilled through at a slight down and right thrust. A large faced 1" bushing is then cemented to front and rear for a good bearing surface. The prop stop is a single No. 4 wood screw 1/2" long. Drill the bushing for the screw, then in place.

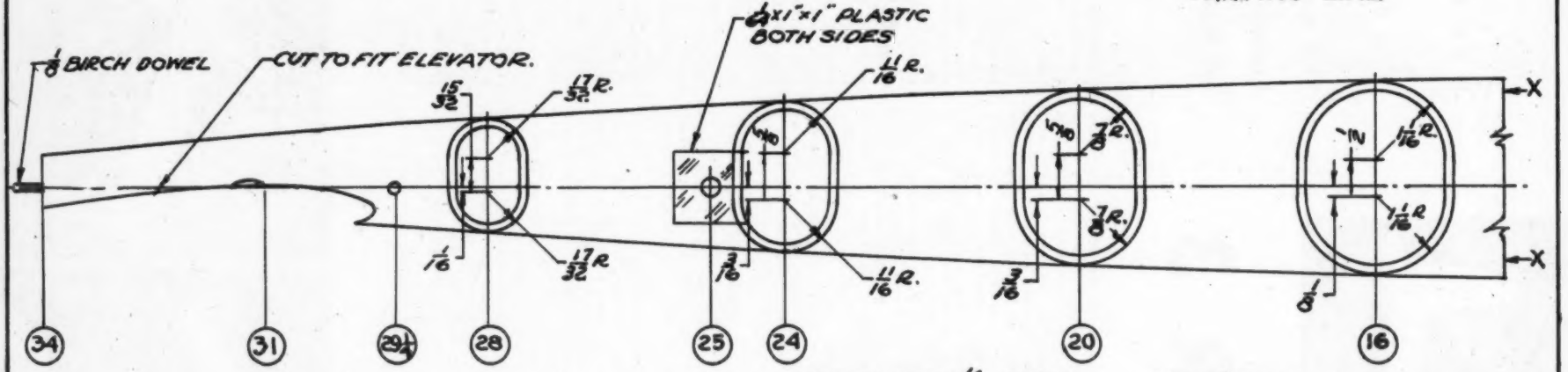
PROPELLER—The prop is carved from two blocks of balsa 1-3/4" x 2-1/4" x 8" (by carving from two blocks you will be able to match the wood in both blades very closely). The hinge is a piece of 1/8" aluminum 3/8" wide drilled at an angle on each end for a flat fold and for .040 music wire which is bent to fit the blades. The entire centersection is wrapped with silk thread and coated with cement; when this is dry the spinner is built up of small balsa blocks, carved and sanded to shape. The final finish over the entire hub was a mixture of talcum powder and cement sanded to well faired lines when dry. The propeller shaft is bent from 1/16" wire. Note the winding hook in front and the large bobbin to protect the rubber on the rear. A very fine finish, accomplished by dope and sanding, is now applied over the entire assembly.

WING—First cut 23 ribs 1/16" thick, sanding them smooth and cutting notches for the spars. As you will probably notice this wing is formed with spars on the top surface, a deviation from the author's usual construction method. After trying numerous wings on this model it was observed that this type gave flights up to 30 sec. longer duration—close inspection and checking showed no apparent differences among the wings other than the spars. Recalling tests performed by E. N. Jacobs some years ago, we concluded that spars located on the top surface serve as a transition strip which in reality breaks up the laminer boundary layer into turbulent flow. This actually produces more lift with a resultant increase in drag, the lift being far greater than the drag. The strips' effectiveness depends on their accurate location, which will undoubtedly vary with the angle of attack,

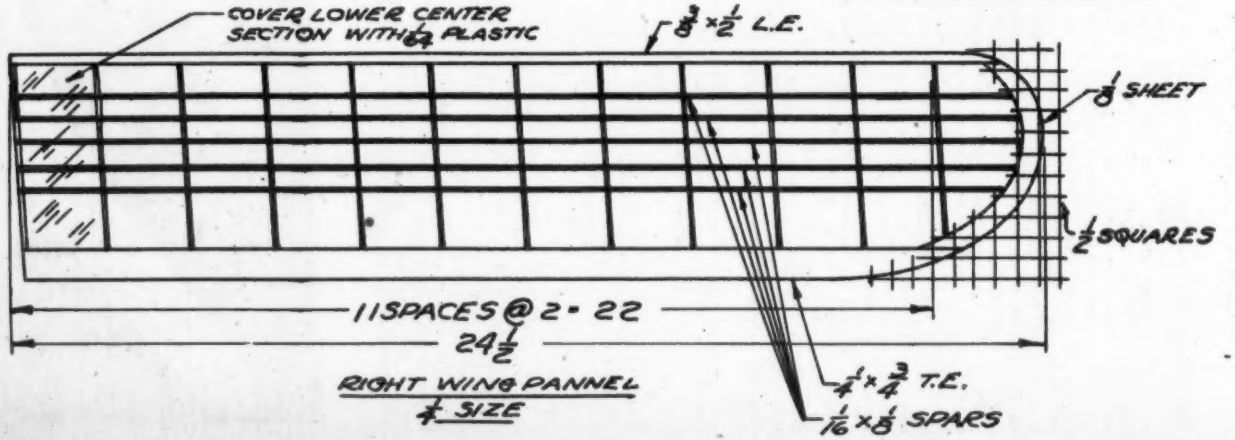
(*Turn to page* 60)



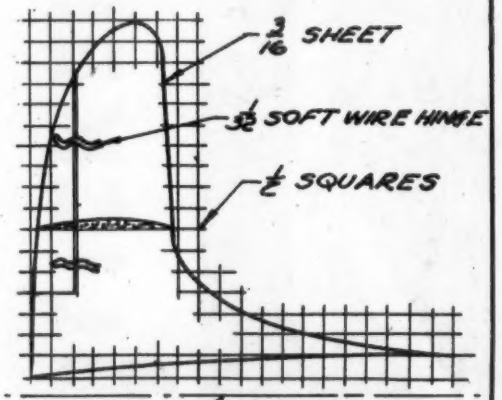




FUSELAGE 1/2 SIZE

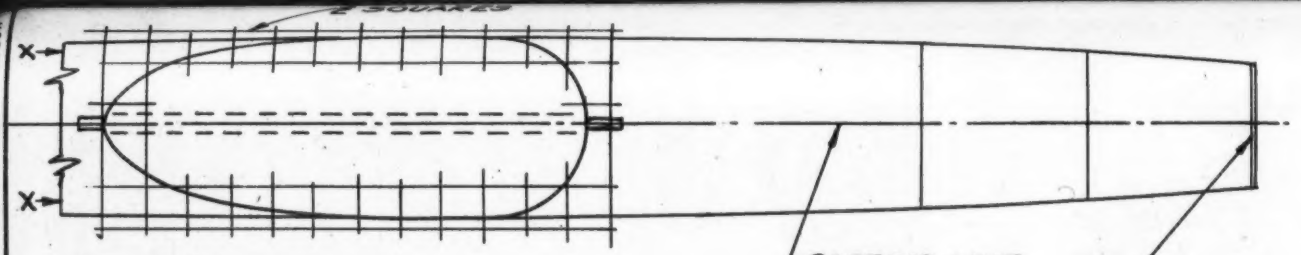


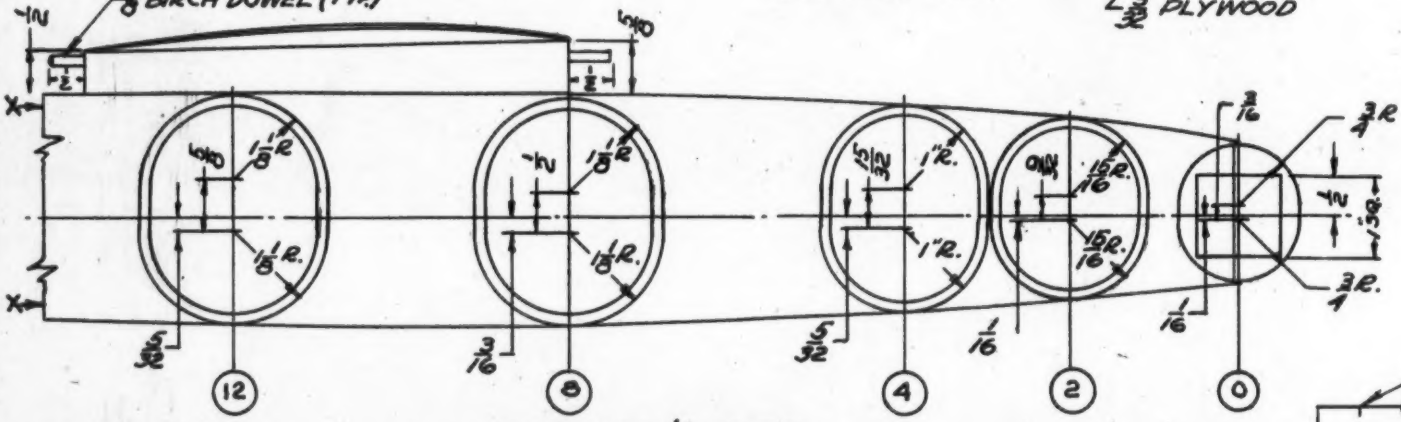
RIGHT WING PANNEL
1/4 SIZE



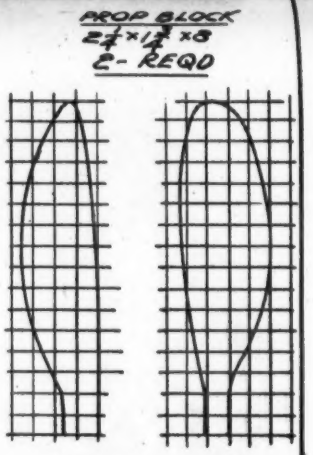
RUDDER 1/4 SIZE

SLICKER "3"
DESIGNED BY DICK EVERETT
DRAWN BY C.W. JOHNSON

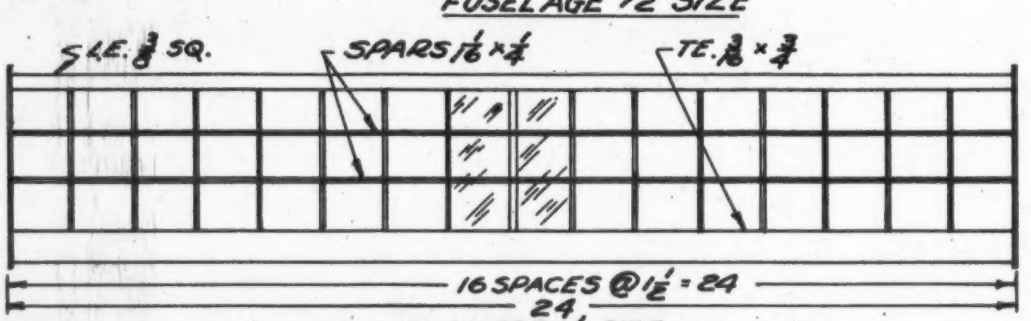




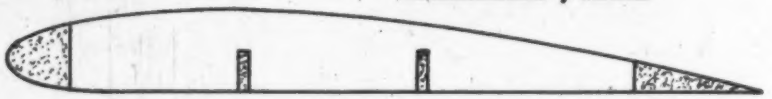
FUSELAGE 1/2 SIZE



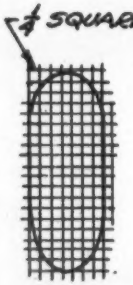
1/2 PROP.
1/4 SIZE



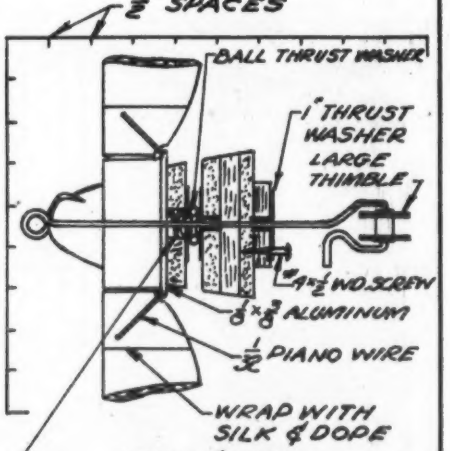
ELEVATOR 1/4 SIZE



ELEVATOR RIB TEMPLATE
FULL SIZE

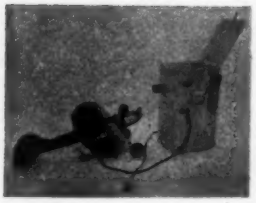


TIP RIB



NOSE & PROP
1/2 SIZE

SLICKER "3"
DESIGNED BY DICK EVERETT
DRAWN BY C.W. JOHNSON



ELECTRIC STARTER

by ERNIE BABCOCK

AFTER watching many modelers, including myself, chewing up their fingers and wasting valuable time on the field in starting the nasty little two-cyclers that have a mind of their own, I decided to do something about it. The results are in the following plans.

The idea has worked out very satisfactorily. The principal thing involved is to ease the handling and overcome the stubbornness of the average motor, since motors today have high compression ratios and are difficult to start by hand. With this setup a lot of headaches are eliminated on the field, allowing more time to fly.

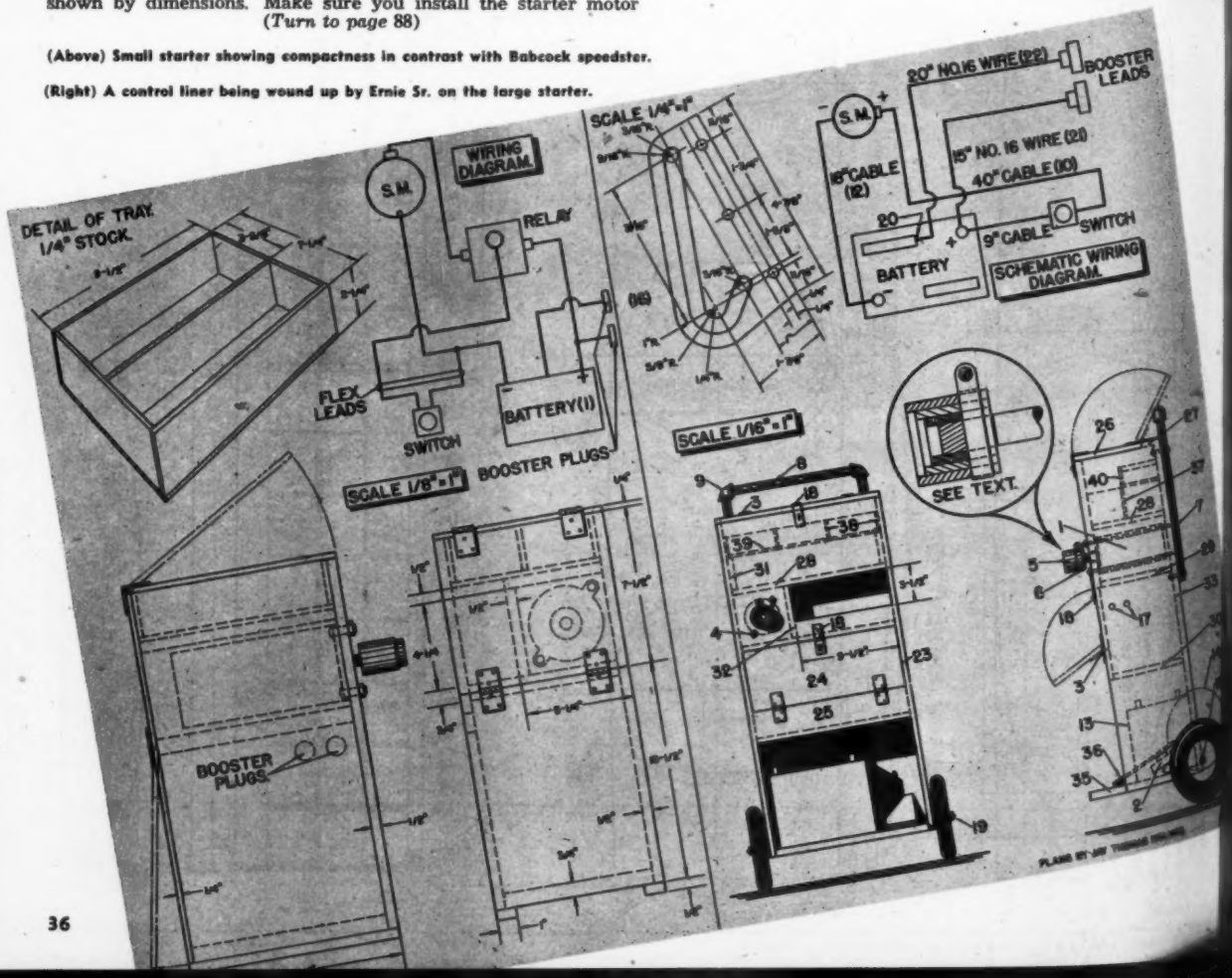
The bill of materials shows sizes of the different pieces used to make up the starter box. When finished the starter box consists of 3 distinct units: the box, tool tray and storage battery. The only difficulty you may encounter is in purchasing some of the parts. The wood can be scrap lumber and need not be held to exactly the same dimensions. Take precaution when making any changes in dimensions or thicknesses of wood that the changes will not weaken the original construction.

All the pieces of wood are rectangular in shape and the only variation is in Item 34, front motor board which has a 3-3/4" x 9-1/2" cutout according to dimensions shown. The pieces may be screwed or nailed together depending on which you prefer but taking care that sufficient strength is maintained. In the front motor board, holes are drilled to receive the starter motor mounting bolts. Location for the shaft center of the starter motor is shown by dimensions. Make sure you install the starter motor

(*Turn to page* 88)

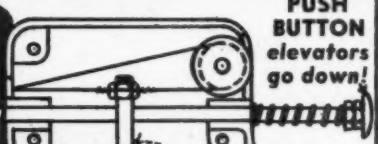
(Above) Small starter showing compactness in contrast with Babcock speedster.

(Right) A control liner being wound up by Ernie Sr. on the large starter.



POLK'S gives a NEW WORLD for model hobbyists!
IF YOU HAVE'NT DISCOVERED THIS, START NOW!

NOW YOU CAN BECOME A Control Line ACE IN 5 MINUTES



PUSH BUTTON elevators go down!

PULL TRIGGER. Elevators go up! RELEASE TRIGGER, reverts automatically to neutral (level) FLIGHT

THE ONLY CONTROL WITH A FIXED NEUTRAL FLYING POSITION

JEM maintains elevators in neutral—automatically! Model climbs or dips only at your command—otherwise level flight always! Position or angle of JEM in your hand, or crossed lines, do NOT affect controls! Unlimited maneuverability with hairline accuracy yours within 5 minutes—or less.

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Because JEM illiminates delicate "wrist-feel" and guesswork, it will make you a control-line ace with a few moments of familiarization only—less than 5 minutes in most cases! No long experience required! No complicated maneuvers to master! Get a JEM and get into the winner's circle—on your own!

A "HEFTY" ALL-METAL AUTO-PILOT!

Precision design, die-cast construction! JEM is no fragile, paperweight makeshift! Weight (approx. 16 ozs.) gives "authority" to cope with tension and weight-pull created by model-in-flight!

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This new, laminated-plastic, control-line flyer is as modern as the Atom Bomb! 26" span. Takes "B" or "C" engine. Assembles in a jiffy! Has excellent stability! $19.50

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Complete kit, easily and quickly assembled. Fuselage and integral rudder molded to finished shape. Completely finished wing, formed metal motor mount, etc. $14.95

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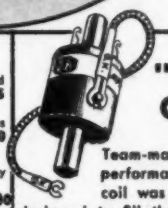

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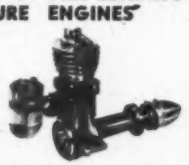
*Without coil and condenser



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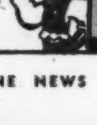

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Arden .099	$19.50
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*Ken .610	32.50
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Dennymite 37	17.85
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*Cannon 358	21.50
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O.K. Twin	35.00
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JETS

Minijet	$35.00
Dynajet	24.50

*Does not include coil and condenser.

GAS ENGINE REPLACEMENT PARTS

Ohlsson 19; 23; and 60, Bantam .199, Arden .099, Bullet, and other engines.

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Free rubber with each kit ordered. All advertised rubber powered kits in stock.

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1/4" 25 ft. for	25c
225 ft. Skein	$2.00
3/16" 25 ft. for	35c
225 ft. Skein	3.00

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McCoy Racer	$42.50
Buesenberg	49.98
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RADIO CONTROL

Good Brothers radio equipment. Receiver, Escapement, Transmitter all 3 units (less batteries) $59.50

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Sea Bird	$ 4.95
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Destroyer Preston	$ 4.00
Queen Mary	8.50
Fireboat (Alers)	10.00
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We stock all advertised free flight and U-control gas kits. All kits sent postpaid. Send us your requirements.

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Aero lt. wt.	$2.50
Arden	2.50
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Competitor	1.95
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Aero Quality	3.00

BRIGHT STAR BATTERIES

No. 360 3V Booster	.50
No. 450 3V Race Car	.50

No. 450 3V Flight	.50
Pee Coil	.06
Med. Coil	.10
Large Coil	.10

CONDENSERS

Aero metal	.35
Smith metal	.35

Flo-Torque Props

6", 8", 10", 11", 12", 13", 14" for free flight ea. .50

6", 8", 10", 11", 12"

Hi-Ball for U-Control ea. .40
14" Hi-Ball .65

BURGESS BATTERIES

2S2SC 2 volt	.50
4F2SC 2 volt	.70
Pee cell	.08
Medium	.10
Large	.10

TIMERS

Arden	1.50
Austin	1.50
Hillcrest	1.35

SPONGE RUBBER WHEELS

7/8"	.25
1 1/4"	.30
1 3/4"	.35
2"	.40
2 1/4"	.50
1 7/8"	.40
2 3/4"	.50
3 1/2"	.60

Battery Boxes—Pen Cell, Med., large, ea. .40

200 ft. U-Control Wire .85

300 ft. U-Control Wire 1.25

S.A.E. 70 oil pt. .50

Spark Plugs V-2; V-3; VR-1; VR-3 ea. .50

TREXLER AIR WHEELS

1 5/8"	.50
2 1/8"	.60
2 5/8"	1.00
3"	1.25
3 1/2"	1.50
4 1/2"	1.75

HELY-ARC WHEELS

1 1/2" dia.	$ .45 pr.
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2 1/2" dia.	.75 pr.

Super-Silkspan "SGS" for large gas models .10

GM Silkspan 3 for 25c

Toggle Switch .45

Snap Switch slide .30

Plywood Available in Following Sizes and Thickness

1/32", 1/16", 3/32", 1/8", 6" x 6" ea. .10

3" x 12" .10
6" x 12" .20

BOLTS AND NUTS

per doz.

1/10" dia. x 3/4" .20
3/32" dia. x 1" .20
1/32" dia. x 1 1/8" .20

	1 oz.	2 oz.	4 oz.	½ pt.
Clear Dope	.10	.15	.25	.35
Clear Cement	.10	.15	.25	.40
Dope Thinner	.10	.15	.20	.30
Wood Filler	.10	.15	.25	.40
Banana Oil	.10	.15	.25	.35
Colored Dope	.10	.15	.25	.45

Include Packing Cost of 5c for each 1 oz., 2 oz., 4 oz. bottle; 10c for half pints.

Colored dope available in following colors: Red, White, Yellow, Blue, Light Blue, Black, Green, Orange, Brown, Olive Drab, Sand, Silver, Sky Blue, Gray.

Balsa Strips 36" lengths

1/16 x 1/16	8 for .05
1/16 x 1/8	8 for .05
1/16 x 3/16	6 for .05
1/16 x 1/4	5 for .05
1/16 x 5/8	4 for .05
1/16 x 1/2	.02
3/32 x 3/32	6 for .05
3/32 x 3/16	5 for .05
3/32 x 1/4	3 for .05
3/32 x 3/8	.02
3/32 x 1/2	2 for .05
1/8 x 1/8	6 for .05
1/8 x 1/4	3 for .05
1/8 x 3/8	3 for .05
1/8 x 1/2	2 for .05
1/8 x 3/4	2 for .07
1/8 x 1	.02
3/16 x 3/16	.02
3/16 x 1/4	.02
3/16 x 3/8	2 for .05
3/16 x 1/2	.03
3/16 x 3/4	.05
3/16 x 1	.07
1/4 x 1/4	2 for .05
1/4 x 3/8	.04
1/4 x 1/2	.05
1/4 x 3/4	.07
1/4 x 1	.08
5/16 x 5/16	.06
5/16 x 3/8	.06
5/16 x 1/2	.08
5/16 x 3/4	.09

5/16 x 1	.12
3/8 x 3/8	.09
3/8 x 1/2	.10
3/8 x 3/4	.12
1/2 x 1/2	.10
1/2 x 3/4	.12
1/2 x 1	.14
5/8 x 5/8	.15
5/8 x 1	.18

Balsa Sheets 36" Lengths

1/32 x 2	.06
1/16 x 2	.07
3/32 x 2	.08
1/32 x 3	.09
1/16 x 3	.10
3/32 x 3	.12
1/8 x 2	.10
3/16 x 2	.12
1/4 x 2	.14
3/8 x 2	.16
1/8 x 3	.14
3/16 x 3	.16
1/4 x 3	.18
3/8 x 3	.22

Balsa Planks 36" Lengths

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1/2 x 3	.22
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3/4 x 3	.30
2 x 2	.50
2 x 3	.65
3 x 3	1.25

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WORLD WAR I

by ROBERT CAMPBELL

MENTION the name *Spad* and one's mind invariably gains the impression of the sleek pursuit biplanes designed by Bechereau and previously described in these pages. Seldom discussed but equally as important in the development of military aviation during the first World War are the Spad two seaters, types 11 and 16. At the time of their conception, the needs of the French air arm for a standardized and up-to-date two place general purpose airplane were urgent. Service types then in use in that category, including the French built Sopwith 1A2, Farman's F.40, the early Dorand, Breguet and Salmson, were fast becoming obsolete and even in numbers were losing ground to the newer German types.

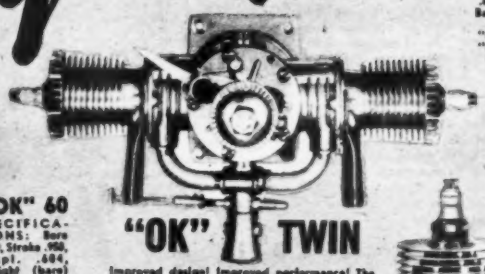
Success of the Spad 7 in 1916 led French authorities to request a two seater possessing some of the fighting qualities of this little pursuit to fill an obvious hole in the aerial lineup for 1917 and 1918. Accordingly, Bechereau expanded the basic Spad 7 configuration into an easily produced two place reconnaissance type powered by a newly developed geared *Hispano-Suiza* engine known as the type 8Bc which delivered as much as 235 hp at 2,150 rpm. The new plane, officially designated Spa.11A2, first flew in September 1916, and with it French authorities held high hopes of success in the coming battles.

Modifications and Trouble

What happened to the Spad 11 after that, however, is a story common to most other two place ships and many single seaters of that day. It didn't seem to make

(*Turn to page 64*)

Everybody is talking..



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"OK" 60

SPECIFICATIONS: Bore .900, Stroke .950, Displ. .604, Weight (bare) 12 oz. Incl. Spark Plug, Bakelite Tank and Fuel Line

$18.00

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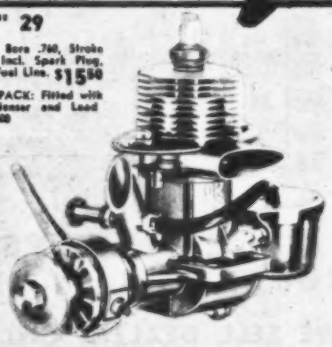
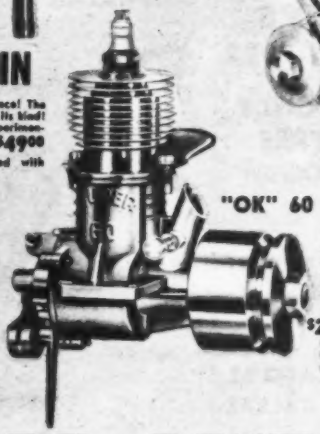


"OK" 29

SPECIFICATIONS: Bore .760, Stroke .660, Displ. .299, Incl. Spark Plug, Bakelite Tank and Fuel Line. **$15.50**

"OK" IGNITION PACK: Fitted with "OK" Coil, Condenser and Lead $3.00



"OK" 60 RACEWAY and MARINE

Especially adapted for Miniature Race Cars and Boats. Piston fitted to cylinder with extra clearance for higher engine speeds. Special crankshaft with keyway. Fully machined and balanced fly wheel with broached keyway. Drop-forged connecting rod, heat treated. Factory tested at over 10,000 RPM. Displacement 16cc

$23.00 including Spark Plug, Bakelite Tank and Fuel Line.
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TWIN IGNITION PACK ("OK" Twin-Coil, High Tension Leads and Condenser) $6 additional.

Make no mistake! The dollars you invest in "OK" Engines continue to perform the most effective "value-for-dollar" job ever . . . your "1946" dollar lost none of its buying power when bartered for an "OK!"

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This consistent value-for-your-money policy is just as true today as it was 10 years ago when "OK" streaked across the horizon — into the plans and hearts of model airplane flyers.

Now, more than ever!, "OK" is the buying word for careful buyers in the model-flying world! You cannot pay less, you cannot buy more!

Leading dealers, coast-to-coast, feature "OK" Engines for their easy starting, consistent running, rugged construction and trouble-free performance!

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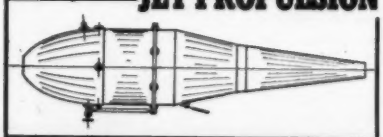

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* * Be one of the first to build a real **Turbo-Jet Model Engine. Single-stage centrifugal compressor and turbine. A real engine, easily made with ordinary home workshop equipment. Complete plans for construction.., design formulas and curves for checking performance and testing.**

$2.00 POSTPAID

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RADIO CONTROL PARTS

Full size sketch showing comparative size of various components: 1. Penlight cell 2. Mica condenser (Micamold) 3. Tubular hearing aid condenser (Solar) 4. ½ watt resistor 5. Tubular ceramic condenser 6. Proximity fuze style tube 7. Midget condenser (Sickles) 8. Flat type hearing aid condenser (Dumont)

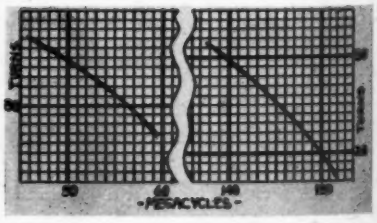


Table of turns for R.F. chokes. No. 34 enameled copper wire wound on ceramic resistor form. 3/16" dia. for 50-54 mc, 3/16" dia. for 144-148 mc band

by E. J. LORENZ

AS A beginner in the radio field you undoubtedly have wondered what tubes, relays, batteries and other accessories to use; or as an experienced builder you probably wished you could obtain some specific part to complete that special job you had started.

TOOLS NEEDED—First of all here is a list of tools required for radio control work. You can get along without some of them and then perhaps you will desire to add others:

Medium size soldering iron, about 60 watts
Pencil type soldering iron with interchangeable tips
A jeweler's saw with various size blades
A small vise and a small anvil
An assortment of small files
Several large flat, half-round and round files
Diagonal cutting pliers, long nose and round nose pliers
An assortment of drills and a small hand drill (preferably drills number 1 through 80)
Several small taps and dies as needed.
Small steel rule and steel scriber
Small pin vise
Hammer and center punch
Small square and compass or dividers for metal work.

These tools should enable you to build almost any article of radio control equipment, although various special tools may be purchased from time to time.

MATERIALS—In the line of materials, several thicknesses of mycarta or bakelite insulation are needed, 1/32", 1/16" and 1/8" being the most commonly used. These can be obtained at most radio supply houses along with Polystyrene, the best insulator for VHF work. Polystyrene, while an excellent insulator for the higher frequencies, has the disadvantage of not holding up under high temperatures especially when soldering is to be done near it. Polystyrene or any of the other plastic insulations can be obtained in sheets, rods and tubes. It should not be used in thin sheets where any weight is to be supported or where it is subject to prolonged heat, over 150° F. Sheets of SO aluminum .030", .040" and .050" and 1/16" thick are an aid and necessity for building cases and small frames for mechanical parts. Brass and aluminum angles 1/4" and 1/2" on a side, along with various sizes of brass and aluminum tubing are essential. An assortment of music wire and copper wire in various sizes as needed are also essential in building the

(*Turn to page* 46)

YOUR LOCAL DEALER
HAS THESE FAMOUS SCIENTIFIC MODEL KITS

"WINDSOR"
25" Wingspan **35¢**

"YELLOWBIRD"
30" Wingspan **50¢**

"ZENITH"
33" Wingspan **50¢**

"ALL AMERICAN"
45" Wingspan **$1.00**

"FIREFLY"
36" Wingspan **$1.95**

"LARKEY"
Class "A" or "B"
50" Wingspan **$3.50**

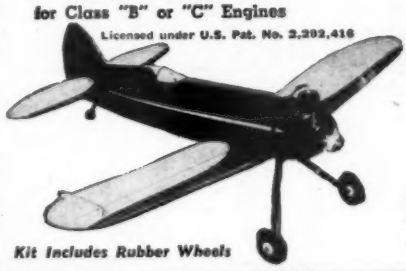
"ATOMIC"
CONTROL-LINE CHAMP
For Class "B" Engines

Designed by
National Champ
Leon Shulman

COMPLETE KIT
$3.50
Including Rubber Wheels

Greater Speeds!
Better Quality!
Lower Price!

"CYCLONE"
for Class "B" or "C" Engines
Licensed under U.S. Pat. No. 2,202,416



Kit Includes Rubber Wheels

Scientific's
U-CONTROL
CHAMPION
$4.95
At your dealer

- Wingspan 36"
- Length 28½"
- Thrilling Speeds of 40 to 90 mph

"GOLD SEAL" *Flying Models*
$1.00 EACH

"OLYMPIC"

"ZEPHYR"

BIG
42"
WINGSPAN

"SPARTAN"

SCIENTIFIC
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"Dealers In All Principal Cities"
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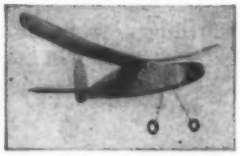
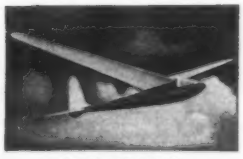
"BANTAM"
25" Wingspan **35¢**



"VICTORY"
32" Wingspan **50¢**



"IMPERIAL"
6 Ft. Wingspan **$1.00**

"MISS WORLD'S FAIR"
No. 1—50" Wingspan $1.50
No. 2—30" Wingspan 50c

"MISS AMERICA"
40" Wingspan **$1.95**

"MERCURY"
Class "C"
6 Ft. Wingspan **$5.50**

48 INCH WINGSPREAD * 37 INCH FUSELAGE * 51 OZ. FLYING WT.

A Real Hit with Model Builders!

CHALLENGER

CONTROL LINE AIRCRAFT

$9.50
LESS MOTOR

A Contest Winner

The Challenger has won 4 firsts and 3 seconds in A.M.A.-sponsored contests in the last 30 days, proving that this highly maneuverable plane will take top honors in any competition.

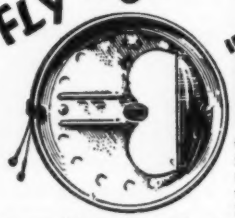
★ EASY TO BUILD ★ EASY TO FLY

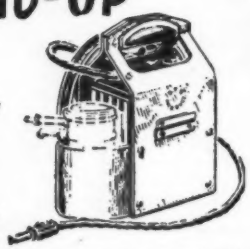
Kit contains a tru-form fuselage, complete precision control system, prefabricated bulkheads, stabilizer, rudder, elevator, formed cowling, wheel pants, complete plans and easy-to-follow instructions.

Licensed Under Jim Walker Patent No. 2,202,416

MARDIX
INCORPORATED 1517 ARAPAHOE ST. DENVER 2, COLO.

FLY · CONTROL · WIND-UP
with
"DTD"



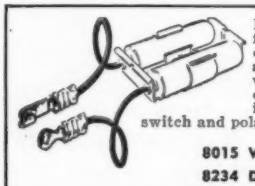


One unit, four oz., metal reel with built in handle, comes complete with 140 ft. wire, two cable ends, instructions and retainer clip.

Holds Burgess booster battery, room for attaching fuel can, prop. wrench, control wires, etc. Made of metal with pistol grip lifting handle.

No. 9007 CONTROLLER
NOW PRICED AT $2.45

No. 1575 HANDI PACK
NOW $1.45



Prefabricated set of four ign. wires, made of best quality oil and gas proof plastic wire. Proven wiring diagram which eliminates ON, OFF, switch and polarity trouble.

8015 Wet cell—.65
8234 Dry cell—.50

Lightweight, ¾ oz. sturdy metal control handle with built in pistol grip.

#9087 Completely finished with red handle.

Each, .75

DTD BELLCRANK— Dural Metal, 3½ c to c. Runs on precision bearings. No. 1515 DE LUXE (3 bearings), $.25; No. 1525 STD. (1 bearing), $.20.

DTD STOWAGE REEL— Metal, completely finished, 5½ dia. with retainer clip, No. 9057. Each $1.00.

DTD CABLE ENDS— Dural metal, fits .010 to .025 wire of cable provides max. safety with min. drag. No. 9027 (kit of four) $.15.

NEWS

- Dealers, write for your free accessory hand book on all DTD accessories. Illustrations show suggested uses of products, and new designs for 1947 release.
- All items in sturdy attractive boxes.
- Patents pending on all DTD designs.
- No retail trade please!—buy at your local dealer or mail order house.

DELTA T DELTA MFG.
President DON DONAHUE
P. O. Box 93 Montrose, Calif.

Plane on the Cover

(*Continued from page 25*)

Location of the center of pressure on a conventional airfoil varies with the angle of attack at which it flies; for example, as the angle of attack increases the center of pressure moves forward thereby further increasing the angle of attack. A conventional cambered wing, then, is inherently unstable. To produce restoring moments on this wing a tail must be used, one that will create forces tending to decrease the angle of attack on the wing and thereby move the center of pressure aft again. Obviously, however, if a wing section could be found whose center of pressure remained constant regardless of angle of attack, the tail airfoil would be unnecessary for "pitching" or longitudinal stability. Two types of airfoil sections contain this strange characteristic: symmetrical airfoils (with identical curves on both upper and lower surface) and "reflex" sections, which turn up at the trailing edge.

Although it would appear that either of these two sections answer the question, each of them contains drawbacks: the reflex section produces less lift and greater drag; the symmetrical airfoil also is a comparatively low lift producer although its drag is very low. It was this last feature that warranted its acceptance as a flying wing profile, for the symmetrical section fulfills two requirements: stable center of pressure and low drag.

Stability of the flying wing has been its nemesis in the past. Its directional stability is hindered by lack of a vertical stabilizer; its longitudinal stability hindered by lack of a horizontal stabilizer and its roll stability hindered by lack of lateral area provided by a fuselage and fin. Directional stability could be improved by use of sweepback: as the wing is displaced in flight direction the advancing wing presents more area to the stream than the retarding wing, thereby creating added drag to the former, which forces it back into position. Longitudinal stability could be improved by locating the center of gravity forward of the center of pressure, thereby producing a constant diving moment to counteract any stalling disturbances. Roll stability could be improved by use of dihedral and sweepback (the latter due to the fact that roll is normally accompanied by yaw). With these three design features a flying wing could be built to fly stable and safely, but these three facts have been known for a long time. Obviously, something else is needed.

The use of these three features introduces additional and complex problems of their own. For example, "weathercock" stability is quite low on the flying wing since it has no vertical tail. For this reason ailerons must be so designed as to produce little or (preferably) no yaw and this yaw must be compensated for by some other surface. Since the center of pressure must be maintained as near constant as possible, the use of high-lift devices presents problems in their design so that they do not exert the conventionally heavy pitching force much in evidence on tailed aircraft. Although an airfoil section may possess stable center of pressure travel at low angles of attack, they frequently exhibit highly unstable tendencies at high angles of attack. Therefore the use of slots or other similar devices must be used to provide pitching stability near the stall.

Although sweepback is used primarily to provide increased directional stability

(*Turn to page 44*)

"TYRO"

A beginner's control-line-stunt model

$3.50

SEE YOUR NEAREST DEALER!

Matty Jr., age 3½—son of the nationally famous designer, Matt Kania—actually flew the TYRO for four laps on three different occasions. This test proves the super-stability and simplicity of the TYRO.

Beginners—the TYRO is designed especially for you. Full size super-detailed plans . . . ½ size pictorial instruction sheets enable you to complete the TYRO in just three evenings. Kit has die cut bulkheads and rudder—shaped leading edges—elevator hinges and pre-formed landing gear. So stable in flight a 3½ year old, *can and did fly the Tyro at a speed of 85 mph!*

Kit No. UC-2

ENGINEERED BY THE MEGOW CORPORATION

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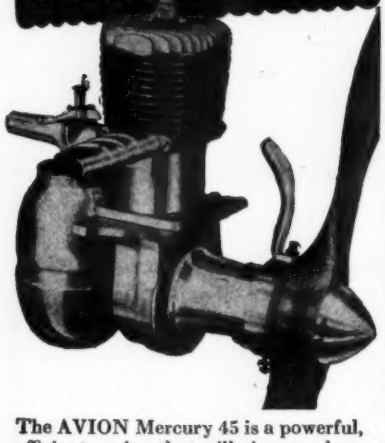
MORE POWER
AND
EFFICIENCY
PER DOLLAR
IN THE
AVION
Mercury 45

3/4 H.P.
AT ONLY
4700 R.P.M.
WEIGHS ONLY 20 OZ.



The AVION Mercury 45 is a powerful, efficient engine that will give you *hundreds of hours* of trouble-free service. It's built to last. And for power, it delivers ¾ H.P., easily and smoothly, at only 4700 r.p.m. It's easy to start, easy to control its speed. For the AVION has a new type carburetor that simultaneously controls the gas and air intake, thus enabling you to operate your aircraft at any speed you desire. But get the whole story on the AVION. Send for our folder. It will show you why, dollar for dollar, the AVION gives you more value, more power, more efficient operation.

AVION
MACHINE & TOOL COMPANY
Established 1938
11 Miller Lane Woonsocket, R. I.

it has a second and highly useful purpose. Since the c.g. must always lie forward of the wing c.p., the farther aft this latter point is moved the greater the range of c.g. travel. Sweepback moves this c.p. rearward and since most of the weight can be concentrated in the nose of the central portion of the wing, longitudinal stability can be provided.

Use of sweepback on a wing reduces its lift at a given angle of attack. Therefore, in order to obtain the same lift the swept wing must be held at a higher angle of attack. This would indicate that the flying wing takes off and lands at a higher angle of attack than a conventional aircraft. However, since the flying wing stalls at a lower angle of attack than a comparable conventional airplane, and since longitudinal stability near the stall is poor, the solution to the problem is the use of high lift devices. However, these devices must *not* create excessive pitching moments. Northrop's solution to this problem is to utilize the entire lower trailing edge of the wing as a flap. When the main flaps are lowered, the lower elevons are lowered simultaneously as are the lower segments of the rudders. This produces increased camber in the wing and increased lift, which eliminates its stable c.p. characteristic and permits the c.p. to move forward with increased angle of attack as on conventional airfoils. However, the increased pitching moment provided by the flaps counteracts this stalling tendency and the result is a stable force arrangement as the flying wing comes in for a landing.

Following a series of all-metal monoplanes containing many new and radical features, Northrop formed his own firm in 1932 and continued his famed series of multi-cellular monoplanes including fighters, bombers, transports and sport planes. In 1938, however, Northrop resolved once again to devote his whole time to the flying wing and resigned from the firm, which was Douglas-owned.

On March 7, 1939 Northrop formed Northrop Aircraft, Inc. for the express purpose of seeing his flying wing through. In August, Northrop began the design of the first true flying wing and the first test model, built of wooden structure covered with plywood, was placed under construction. Wind tunnel tests of small models provided data on the effectiveness of anhedral (negative dihedral) wingtips, these surfaces actually being inverted airfoils producing an outboard thrust. When the plane yawed, these two thrusts formed a lateral couple which tended to return the plane to its original direction of flight. The model, known as the N-1M, was completed and made its first test flight in great secrecy at Muroc Lake with veteran test pilot Vance Breese at the controls.

Progressive changes in design followed by flight tests by Moye Stephens evolved the first true flying wing. The model was so designed that the wingtips, wing dihedral and wing sweepback could be quickly altered through use of drilled quadrants through which bolts could be inserted. The tiny 38 ft. model underwent more than 200 test flights until, eventually, the wingtips were made straight and the world's first true flying wing was flying safely, speedily and under perfect control. The N-1M is now on display at the Wright Field museum.

The success of these experiments soon reached official War Department ears and in September 1941 Assist. Sec. of War Robert Lovett and Maj. General Oliver P. Echols visited the Northrop plant and conferred at length with the designer. Could Northrop build a successful bomber with a range and load greater than any aircraft in history? Yes, they were told.

Northrop prepared specifications and design data and an experimental contract was awarded. Next step was the design and construction of a 1/3 scale model of the giant bomber, designated the XB-35. In order to accelerate the program four of these 60 ft. models, the N-9M, were built and tested. With the backing of the War Department in his dream, Northrop eagerly accepted the offers of assistance proferred. Wright Field departments and laboratories, the wind tunnels of the National Advisory Committee for Aeronautics at both Langley Memorial Aeronautical Laboratory, Langley, Va. and the Ames Aeronautical Laboratory, Sunnyvale, Calif., government offices in Washington, the Northrop wind tunnel, the Pratt & Whitney laboratories at East Hartford, Conn.—these and many others were combined into the project.

While valuable data were being provided by flight tests of the N-9M's, Northrop engineers worked feverishly on the detailed design of the XB-35. A wooden mock-up of the giant bomber was inspected and approved by Wright Field engineers on July 5, 1942 and final approval of the XB-35 features was given. Work on the XP-61, an urgent AAF project however unavoidably slowed the work on the XB-35 and engineers of the Glenn L. Martin Co. were enlisted in the project.

While nearly 1000 engineers labored day and night on the huge craft, the months slipped by. V-E Day came and went and the structure of the XB-35 began to take shape. Work continued at top speed and V-J Day and the end of the war came. But the XB-35 was not a weapon for World War II and it is doubtful that it would even have been necessary to employ it. Finally on June 25, 1946 test pilot Max Stanley, co-pilot Fred Charles Bretcher and flight engineer O. H. Douglas climbed into the XB-35 and raced down the runway and into the air for the first time. Forty-four minutes later the monster XB-35 came to earth on Muroc Army Air Base, 85 miles away, and touched down on the same ground used in the first model tests nearly six years previously.

The XB-35 is a large long range strategic bomber capable of carrying a 10,000 lb. bomb load for a distance of 10,000 miles. It has a wingspan of 172 ft. and is 53 ft. long. It weighs 89,000 lbs. empty and 162,000 lbs. loaded and is capable of a maximum loaded weight of 209,000 lbs. It is powered by four Pratt & Whitney R-4360 *Wasp Major* engines developing more than 3000 hp each and driving counter-revolving eight-blade propellers mounted along the wing trailing edge. It carries a crew of 15 men, 9 on active duty and 6 sleeping within the crew compartment.

Its armament consists of 7 remotely-controlled gun turrets mounted on upper and lower surfaces of the wing. The landing gear consists of two dual-wheel main gear units 5 ft. 6 in. in diameter which fold aft into the wing, and a single-wheel nose gear 4 ft. 8 in. in diameter which folds laterally into the wing.

The control system, previously described, is provided with a hydraulic boost system and a special "forced feel bellows" system which provides pilot "feel" on the controls, which is often lacking in control boost systems. The electrical system is a three-phase alternating current 400 cycle, 208 volt design

(*Turn to page* 46)

MODEL AIRCRAFT *is Always* FIRST *with the* LATEST!

CONTROL MODELS

A J Whip. Power-P39	$ 1.25
A J Fireball	10.00
Aero Puppet	5.95
Atomic	3.50
Baby Miss Behave	2.65
Baby Shark	2.95
Berkeley Controliner P-47	5.95
Bipo	3.95
Buzz	8.95
Cadet	5.45
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Custom Cruiser	10.00
Cyclone-Scientific	4.95
Dmeco Special	7.95
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Falcon Hawk P&E	6.95
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G-13	7.95
Hellhamer	7.95
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Skycycle	7.50
Sting Ray	4.75
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Tether Sharpie	1.00
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Whizzer Standard Kit	7.50
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Wren	6.95

DESIGNER'S SPECIALS

Genuine Dietzgen Drawing Board, size 18 x 24"

T-square, celluloid angles, curves, protractor, pencils, erasers, ink, paper and triangular scale. 2 bow Charvos instrument set included $16.55

"CHARVOS" DRAWING INSTRUMENTS

No. 614	$18.00
No. 612	10.80

WHAT TO BUILD IT WITH

X-Acto No. 83 Set	$ 5.00
X-Acto No. 84 Set	7.50
X-Acto No. 85 Set	12.50
X-Acto No. 62 Set	2.00
61 to 80 drill set in index case	3.50
Set of Swiss Type Files (12)	4.00
Set of 6 Screw Drivers	4.00
Chicago Handy Grinder	20.00
Chicago Handy Grinder De-Luxe Set	27.50
Burgess Vibro-Tool	7.50
Plastic Craftsman Set	$2.00
DeLuxe Vibro-Tool Outfit	$16.50

GAS ENGINES — PACKED WITH EXTRA POWER!

Arden	$19.50
Atwood Champion .60	23.50
Bantam .199	18.50
Barker .60	24.50
Blakely C .60	35.00
Bullet "27"	12.75
Cannon B .300	19.75
Contestor .60	28.50
De Long "30"	19.50
Dennymite Airstream .57	15.85
Fleetwind .60	24.75
Hornet .60	35.00
Hurricane .24	19.75
Ken .610	32.50
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McCoy Red Head (for planes)	35.00
Melcraft B .29	18.50
Merlin .24	18.00
Minijet	35.00
Mighty Midget "45"	24.95
Ohlsson .23	16.50
Ohlsson .60	18.50
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Vivell .49	20.00
OK B .29	15.50

O.K. SUPER "60"
Less Coil and Condenser **$18.00**
SPECIAL!
DeLong .30 . $19.50

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Albatross	$3.50
Jesco Floater	2.00
Sailing	1.00
Super Sinbad	2.50
Thermic 50	1.00
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Thermic 70	3.50
Thermic 72	3.50

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All American	$1.00
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Miss World's Fair	1.75

ARMORED DIVISION

Amphib. Jeep	$2.75
Rogers AA Gun	2.95
Searchlight	1.00
2½ ton Truck	1.00
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PLASTIC PLANES

TBF-1 Avenger	$2.00
P-61 Black Widow	2.50
SB2A-1 Buccaneer	2.00
F4U-1 Corsair	2.00
B-17 Flying Fortress	5.00
A-20 Havoc	2.50
F6F Hellcat	$2.00
SB2C-1 Helldiver	2.25
A-26 Invader	2.50
B-24 Liberator	5.00
P-38 Lightning	2.00
P-51 Mustang	1.50
B-26 Marauder	4.00
B-25 Mitchell	3.00
L-4 Piper Grasshopper	3.50
C-54 Skymaster	6.00
C-47 Skytrain	6.75
B-29 Super Fortress	9.50
P-47 Thunderbolt	1.75
P-40 Warhawk	1.50

Base for Airplanes, 15c and 25c
Also METAL TANKS AND SHIPS. (Send for complete list)

GRADE AA'-BALSA

STRIPS—(All 36" length)

1/16 x 1/16	.01
1/16 x 1/8	.01½
1/16 x 3/16	.02
1/16 x 1/4	.02½
3/32 x 3/32	.01½
1/8 x 1/8	.01½
1/8 x 3/16	.02½
1/8 x 1/4	.03
3/16 x 3/16	.03
1/4 x 1/4	.04
1/4 x 1/2	.08
1/8 x 3/8	.04
1/8 x 1/2	.05

SHEETS—(All 36" length)

	2"	3"
1/32	.08	
1/16	.08	.12
3/32	.10	.15
1/8	.12	.19
3/16	.16	.20
1/4	.18	.25

PLANKS—(All 36" length)

	2"	3"
1/2 x 2	.25	.40
3/4 x 2	.40	.55
1 x 1		.25
1½ x 2	.70	1.00
2 x 2	1.00	1.50
3 x 3		1.75

MINIMUM BALSA ORDER $3.00

GAS MODEL ACCESSORIES

Aero Coils—Light Weight	$2.50
Quality	3.00
Aero Condensers	.25
Heavy Duty	.45
Alligator Clips	.12
Austin Timers	1.50
Battery Boxes—Pen-lite, intermediate and large	.40
High Tension Leads, sol. ends	.15
Ignition Wire, 5 feet	.15
Motor Mounts—Metal, A & B, 30c; C	.50
Power Plus Wet Cells	$2.75-3.50
Battery Charger	4.45
Burgess Batteries 3A2—Special for Race Cars & Boats	.60
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Burgess Batteries 2Z2SC	.50
Burgess Batteries 4F2H Booster	1.05
Adjustable Control Handle	.69
Megow Battery Case	.40
Slim Jim Case	.40
Spark Plugs V-V2-V3-VR1-VR2 Each	.50
Toggle Switches	.50
U-Reely Control	7.50
Braided Wire—72 & 90 lb. test, per foot	.05
U-Control Wire 100 feet	.50
140 feet	.75
Universal Flexible Needle Valve	1.25
Universal Needle Valve	.75
Wilco Coils..$1.95; Economy	1.00

GAS PROPS

FOR U-CONTROL—HI-THRUST, 10° PITCH

8"-9"-10" ..... 45c 12"-13" 60c
11" ..... 50c 14" 65c
Snafu 75—10"—75c

We're omitting pictures in this ad so that we can list more items for your selection!

CLEAR DOPE $3.30 GAL.
COLORED DOPE **$2.75 Per Gal.**
OLIVE DRAB—SEA BLUE—WHITE
(Any 4 gallons for $10.00)
BRUSHES—$1.45 Complete Set

Round to pin point—00	For super detail and striping
Flat—¼"	For small planes
Flat—½"	For medium planes
Flat—¾"	For large C ships

Class D—26"
Reuhl Bakelite
Racing Hydroplane Kit $12.50
FOR FREE FLIGHT
Flo-Torque—8" to 14", finished and hi-lacquered—50c
Don Williams for Free Flight
6" pitch ..... 16" 90c 18" 95c
Snafu 90—12" 90c

FREE FLIGHT GAS KITS

Aero Champ—B	$ 2.50
Air Foiler	3.95
American Ace 36-A	1.50
American Ace 54	3.95
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Bay Ridge Roamer, A or B	2.95
Bay Ridge Mike B	2.00
Bee A	1.95
Brigadier B-58	2.95
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Buccaneer 48	3.50
Buccaneer A-36	1.50
Buccaneer B Special	3.95
Buccaneer C Special	6.95
Capitol Piper Cub Cruiser-C Ideal for Radio Control	10.95
Coronet, A or B	2.50
Custom Cavalier	15.00
Interceptor (Comet)	3.95
Jersey Javelin, A or B	3.95
Jiffy A	1.50
Little Chief A	2.95
Mercury C, 6 ft. wing	5.50
Musketeer "54"	3.50
Pacer B	3.95
Pacer C	4.95
Piper Cub, B-52 ¾"	6.95
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148 Finished Plastic Models
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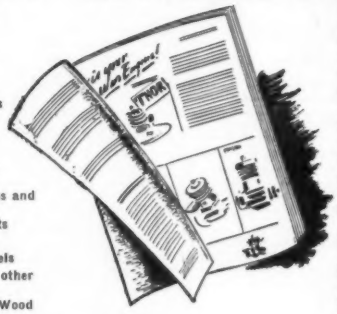

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containing more than 10 miles of wiring. Engine cooling, oil cooling, and supercharging air is provided through leading edge air intakes that duct the air into a series of "plenum chambers," which provide engine cooling through the use of giant fans. The engines are actually installed backwards to drive the propellers, the fans being located on the rear end of the engines.

A total of 15 of the giant flying wings are being built, including two experimental models and 13 service-test models. The XB-35 represents an investment of $13,000,000 and the total value of the contract is expected to approach $100,000,000.

Certainly, the successful flight tests of the XB-35 have vindicated the pioneering belief in the flying wing by John K. Northrop. Certainly, too, the B-35's are not the final chapter but rather only the prologue of the Story of the Flying Wing.

Radio Control Parts

(*Continued from page 40*)

radio set and mechanical equipment. Assorted eyelets, rivets, screws, small nuts and bolts, soldering lugs and other small items of hardware are essential but can be picked up as needed at most radio supply houses, hardware stores and model supply shops.

VACUUM TUBES—Now for information on tubes and circuit components. Choice of tubes for the transmitter and receiver is quite large, and numerous ones will work. The essential factor is to use a minimum number of tubes for a given purpose and to take into consideration the voltages and current drain of the tubes you plan to use. It would be as foolish to run a transmitting tube having a 6 volt filament with a .75 amp drain on dry cells as it would be to use a large unwieldy complicated power supply for a 1-1/2 volt tube that could be run off batteries. For the receiver the RK-62 or the miniature version, the RK-61, is the best all-round performer. This tube has low voltage and current characteristics, and being a gas thyratron eliminates using more than one stage in the receiver. These tubes may be purchased from the Raytheon Manufacturing Corp. of Newton, Mass. The price is $3.50 for both the RK-62 and RK-61. The RK-61 has wire leads and is self supporting while the larger RK-62 has a standard 4-prong socket.

The tubes in the 9000 series may be used to good advantage in certain circuits but their characteristics require several stages to operate a relay if used in a super-regenerative circuit. There are several good miniature tubes with pin leads such as the 3A5 and the 1S5 which may be used. Information on various tubes can be obtained from a radio "ham" book or manufacturers' tube manuals.

We will not go into all the tubes that can be used since the circuits vary and the tubes are used for different purposes. If you have a knowledge of radio you will pick the tubes of your choice, whereas if you are a beginner it is best to follow tried and proven plans. The choice of transmitting tubes is perhaps a little wider than those for receivers. There are quite a few twin triodes that are good up through the 144-148 mc band. The Hytron 114B and Hytron 615B are excellent triodes for VHF work, as is the new Hytron 2E30 tetrode. The RK-34, 6J6 and

(*Turn to page 48*)

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MODEL AIRPLANE CO.

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We Have What You Want in Stock, Now! No Delay!

The Nation's Oldest Hobby House at "The Hub of the Universe"

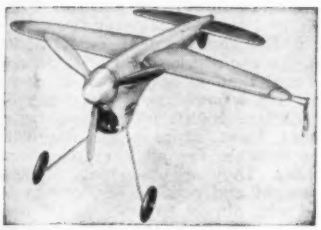
Read the ads in Model Airplane News, then Write or Wire!

The New ARDEN Class "A" MOTOR

$19.50

Incl. Coil & Condenser
By Mail, $19.75
Arden Motor with Ball Bearing, $22.50

It weighs only 2¼ ounces, but it's packed with power that will thrill you, and make your favorite model a "best" performer. .099 cubic inch displacement. Dependable and easy starting.



NEW TOPPING ±100 Control Line Sensation
Beautifully contoured aluminum completely preformed for speedy assembly.....$10.00
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VIVELL SUPER 35

$18.00

A small Class C motor for Class C or large Class B free flight planes. Ideal for U-control.

A Post-War Engine at Pre-War Price!

NEW IMPROVED

THOR Class "B"

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By Mail, $10.20
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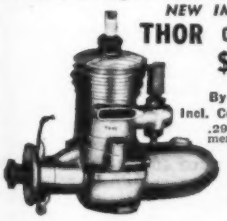

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Brand new. Class C—.60 cu. in. displacement. Hardened steel cylinder and head; steel piston; twin intakes emulsify gasoline before mixing; twin exhaust ports of special design; long life bearings; new type metal gas tank, capacity 1 oz. Guaranteed for 60 days.

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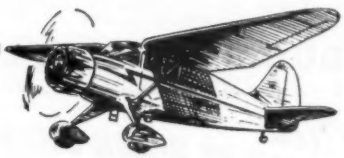

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Builds up and flies like a real plane. 2" scale. Span 82½ inches. Can carry up to 5 lbs. of equipment. Complete, less motor.....$15

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		Interceptor	1.95
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Ready-To-Fly Strato Trainer

Completely assembled, a professional job. Includes a Fleetwind Motor, coil, condenser switch, battery pack and all wiring. Attach your control lines, gas up and fly. By Mail $40.20

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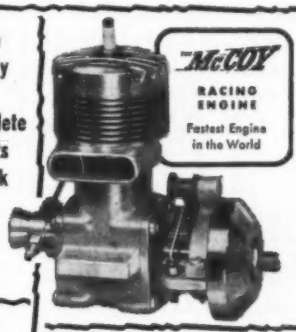

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A NEW model engine built to give you championship performance every flight. Easy starting and easy to control. Less Coil and Condenser.

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Cast aluminum body, rubber tired wheels, built-in gas tank, ball bearing rear wheels. Correctly balanced, accommodates any engine.

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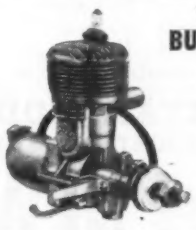

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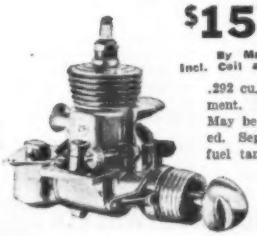

.292 cu. in. displacement. Wt., 4¾-oz. May be used inverted. Separate plastic fuel tank. Equipped with rotary valve, dual charge carburetion.

Falcon CADET Stunt Plane

$5.45

Less Motor
By Mail, $5.70

It's the latest by Frank Greene. Light enough for class B motors. Wing span 33 inches, length 24 inches. Duralumin control horn, 100 ft. .012 line, spring steel wire, waterproof firewall, plenty of silk span. Complete kit (dry).

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A super flyer!

Kit—dry $2.50, with liquids $2.95

Flying Cloud	$1.50	All American	$1.00
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Good Quality—Non Synthetic—Uniformly Cut

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Thermic Trio	0.35	Imperial	1.00
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The Bipe	3.95	Berkeley P47	5.95
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CLASS B
.275 cu. in.
Rotary valve
Weight 4½ oz.

$12.75 P.P.

Less coil and condenser

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1/16 x 1/16	each 1c	1/64 x 2	each 8c
1/16 x 1/8	1½c	1/32 x 2	8c
1/16 x 1/4	2c	1/16 x 2	8c
1/16 x 3/8	2½c	3/32 x 2	10c
1/16 x 1/2	3c	1/8 x 2	10c
3/32 x 3/32	1½c	3/16 x 2	14c
1/8 x 1/8	1½c	1/4 x 2	16c
1/8 x 1/4	2½c	3/8 x 2	20c
1/8 x 3/8	3½c	1/2 x 2	22c
1/8 x 1/2	4c	1/32 x 3	10c
3/16 x 3/16	2½c	1/16 x 3	12c
3/16 x 1/2	5c	3/32 x 3	15c
1/4 x 1/4	3½c	1/8 x 3	19c
1/4 x 1/2	6c	3/16 x 3	22c
1/2 x 1/2	9c	1/4 x 3	25c

Beveled balsa trailing edges, 36" lengths

3/32 x 3/8	3c	3/16 x 3/4	6c
1/8 x 1/2	4c	7/32 x 7/8	7c
5/32 x 5/8	5c	1/4 x 1	8c

CLEAR DOPE, THINNER, OR CEMENT 1 oz. 10c, 2 oz. 17c, 4 oz. 25c, ½ pt. 40c, pt. 60c, qt. 85c, gal. $2.75.

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Austin Timer	$1.50	Air Wheels 2½"	$1.00
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Fiotorque, 8"-14"	0.50	3"	1.60
Bat. Box. L. M. Sm.	0.40	Al. Motor Mts. lg.	0.55
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Bambco Paper, white, red, yellow, blue, green ... 0.10
Sponge wheels, 2" 40c, 2½ 50c, 3½ ... 0.60

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LEADER brings you this outstanding addition. More realism . . . better flying, landing and genuine free-wheeling for your model! Very easy to install. Hold firmly in place. Machined in brass. Set screw. For ⅛" and 3/32" axle. Complete with hub and back washer.

SET OF FOUR PIECES..... 25¢

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NEW MOTOR FLYWHEELS

Machined to .001 tolerance. True balance. 3 convenient sizes:

CLASS "A"	"B"	"C"
5/8" x 1-1/2" bore: 1/4" or 3/16". wt. 4 oz.	7/8" x 2" bore: 1/4" wt. 10 oz.	1" x 2-1/2" bore: 5/16" wt. 16 oz.
$1	$1.75	$2
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Note: Class "A" flywheel is ideal for U CONTROL

MOTOR CONTROLLERS
Movable point retainers for Ohlsson 17oo timers each 15c p.p.

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6 oz. size..... 75c
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3A5 are also excellent transmitting tubes for VHF. For the 144-148 mc and higher bands, special tubes must be used. The acorn tubes are fine but are limited in their power output. The midget tubes in the 9000 series are excellent for high frequency work but like the acorn tubes these also give limited output. Perhaps one to watch for is the Raytheon 6N4 which is a high frequency tube and is claimed to reach up to the 500 mc mark. To sum it up, either follow a proven set of plans when building your set or chose tubes to meet your requirements from makers' manuals or from the Radio Amateur's Handbook. By writing to the Hytron, Raytheon, or Sylvania companies you can secure valuable information on small tubes.

RELAYS—Outside of selecting the proper tube for your receiver, the matter of what relay to use and where to obtain it is a problem. The relay acts as a switch between the radio circuit and the mechanical control of the plane. It must function with a minimum of change in plate current and must be relatively unaffected by vibration. Above all it must be lightweight and dependable. The RK-61 and RK-62 tubes require a relay with a DC resistance of 7000 to 10000 ohms. To use a relay of 3 or 4 thousand ohms and then to add a resistor in the circuit is a waste of power and is inefficient design. Sigma Instruments Inc. of Belmont, Mass., make excellent sensitive relays suitable for model radio control purposes. They are extremely sensitive, lightweight and reliable and can be obtained with almost any desired DC relay resistance. These relays have screw adjustments for the contact points and armature tension. The Kurman Electric Co. of Long Island, N.Y., produce a very small and lightweight relay but they are limited to comparatively low DC resistance and do not have screw adjustments. In some circuits, depending on the tube, these Kurman relays are very good due to their small size and light weight.

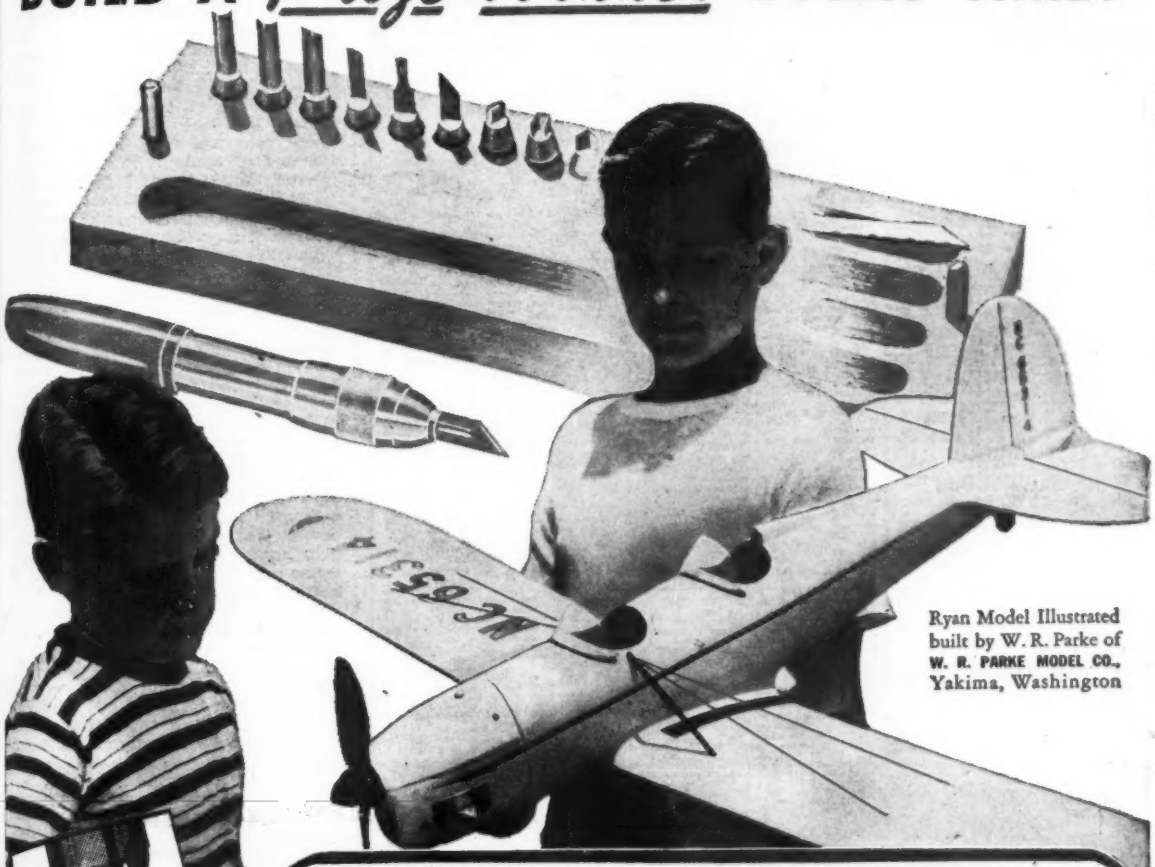
The problem of constructing your own relay lies in winding the coil which consists of No. 42 or smaller wire; having seen the size of No. 42 wire you will understand the difficulties involved. The relay given in the September issue of M.A.N. was made with a coil obtained from Sigma Instruments Inc. and is a very sensitive and reliable little relay. The chief advantage is its low weight and high contact pressure, thus keeping the worry about relay chatter or vibration to a minimum.

BATTERIES AND POWER SUPPLIES—By far of least concern regarding the receiver and transmitter is the matter of power. We will discuss the receiver first. Main consideration is the voltage required and the current consumed. There are several small batteries which can be used, but they are so small that a tube having a large current drain would deplete the battery in a short time. For the filament supply one penlight cell will take care of a current drain of 50 to 75 ma for several flights of 20 to 30 min. each. The large sizes of flashlight batteries will last proportionately longer.

The small wet cells, especially the Vitamite, are excellent for the filament supply if they are stepped down from 2.2 volts to 1.4 volts with a 16 ohm 1/2 watt resistor. These cells will last for several days' flying when used as filament supply. They are also recommended as a source of power for escapements and other mechanical means of operating the various controls.

(Turn to page 50)

BUILD A *Prize Winner* EVERY TIME!



Ryan Model Illustrated built by W. R. Parke of **W. R. PARKE MODEL CO.**, Yakima, Washington

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is taking the country by storm. Model builders from Coast to Coast are proclaiming this versatile all-purpose cutting tool, with over 20 interchangeable accessories, as tops in its field. Every model builder needs one—every model builder WANTS A GENIE TOOL, once it's seen. Set No. 95 illustrated in photograph above, complete with 13 accessories and wood chest... $9.95.

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Skyway's Plane Talk

Free DELIVERY IN U.S.A.

24 HOUR SERVICE GUARANTEED

TRY YOUR DEALER FIRST. OTHERWISE WE WILL SUPPLY YOU

WE STOCK ALL WORTHWHILE ADVERTISED KITS AND SUPPLIES

BALSA SHEETS—2x18
(2 x 36 or 3 x 18 cost 3 times)
(3 x 36 or 4 x 16 cost 5 times)
(2 x 60, 4 x 36 cost 7 times)
(3 x 60 cost 8 times)
(4 x 60 cost 10 times)

1/64	5 for 10c	5/32	3 for 10c
1/32	5 for 10c	3/16	3 for 10c
1/20	5 for 10c	1/4	2 for 10c
1/16	5 for 10c	5/16	2 for 10c
1/32	4 for 10c	3/8	2 for 12c
1/8	4 for 10c	1/2	2 for 13c

BALSA 18" STRIPS
36" cost triple 18"
Sizes marked * are also stocked in 60" size. They cost 5 times 18". Minimum order on 60" is $1.00.

1/16 sq.	15. 5c	3/16x3/8*	3. 5c
1/16x1/8	10. 5c	3/16x1/2*	2. 5c
1/16x3/16	7. 5c	3/16x3/4*	4c ea.
1/16x1/4	6. 5c	3/16x1*	4c ea.
1/16x3/8	6. 5c	1/4x1/4*	3. 5c
1/16x1/2	5. 5c	1/4x3/8*	2. 5c
3/32 sq.	10. 5c	1/4x1/2*	2. 5c
3/32x3/16	7. 5c	1/4x5/8*	3c ea.
3/32x1/4	5. 5c	1/4x3/4*	4c ea.
3/32x3/8	4. 5c	1/4x1*	4c ea.
3/32x1/2	3. 5c	5/16 sq.	2. 5c
1/8x1/4*	8. 5c ea.	3/8x3/8*	5c ea.
1/8x3/16*	7. 5c	3/8x1/2*	5c ea.
1/8x1/4*	5. 5c	3/8x3/4*	6c ea.
1/8x3/8*	5. 5c ea.	3/8x1*	5c ea.
1/8x1/2*	3. 5c	1/2x3/4*	6c ea.
1/8x1*	3c ea.	1/2x1*	2. 15c
5/32 sq.*	4. 5c	5/8x5/8*	2. 15c
3/16 sq.*	4. 5c	3/4x3/4*	2. 15c
5/16x1/4	4. 5c	3/4x1*	8c ea.

18" BALSA PLANKS
36" Cost DOUBLE 18"
60" Cost TRIPLE 18"

1/4x3/4	.06	1x6	.45
1x1	.08	2x2	.30
1x2	.15	2x3	.45
1x3	.25	2x4	.60
4x4	1.25	4x6	1.85
2x6	.90
3x3	.75
3x4	.98
3x6	1.35

NOSE BLOCKS

1x2x1	6. 5c	2x4x6	15c
1x2x2	3. 5c	2x5x5	17c
1x2x2 1/2	3. 5c	2x6x6	25c
1x2x6	5c	3x3x3	10c
1x3x3	4c	3x3x6	19c
1x3x6	7c	3x6x6	40c
2x2x3	7c	4x4x6	27c
2x3x3	7c	4x4x6	45c
2x2x6	10c	4x6x6	60c

36" TAPERED TRAIL. EDGES

3/32x3/8	5c	3/16x3/4	8c
1/8x1/2	5c	1/32x7/8	9c
5/32x5/8	7c	1/4x1	10c

Can be had in 5 to 1 at double these prices.

BAGS O' BALSA $1.00
VALUE $3

Sent express collect. NO Packing charge. PLANKS & BLOCKS up to 20 pcs. Approximately 2" thick, 3" to 4" wide, 1" to 10" long. For fuselage bodies, wings, nose blocks, stripping, planking, etc.

PROPELLERS

Balsa Rubber Powered	Gas Model Varnish
5" 4c	x
6" 5c	x
7" 6c	x
9" 7c	x
9" 8c	50c
10" 9c	50c
11" x	50c
12" 10c	50c
13" x	50c
14" 12c	50c
15" 15c	x
16" 16c	x
16" 25c	x

PLASTIC
3 3 4
bl. bl. bl.

1 1/4"	2c	10c	10c
2"	2c	x	15c
2 1/4"	3c	15c	x
3"	5c	15c	30c
3 1/4"	10c	20c	x
4"	15c	30c	30c
5"	20c	50c	x

SILKSPAN, white, Gas Model 5 for 25c.

PRE-WAX SILK, Triple A grade, 4 mm—$1.98 sq. yd.

RUBBER POWER ACCESSORIES

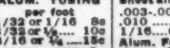
Real Rubber 1/8 or 1/4	2c ft.
Real Rubber Bands 1/8 x 6	2c ea.
Model Pins 1/2" or 1"	50-5c
Celluloid 6x10	10c
Ball Bearing Washer 3/8 or 7/16"	10c
Pin Hole Washer 1/4"	Dz. 5c
Bandpaper, 4 sheets 6 x 9	5c
Insignias, Four colors, 36 assd'd Amer., French, English, German, gummed, per sheet	5c
Colored DECAL squadron insignias, 6 pair per sheet, 10 COUNTRIES! 1" dia.	10c/ 1 1/2" dia. 15c
Prop Shafts, 4m, 5m, 6m, 8c; lge.	10c
THRUST BEARINGS, small, 4 for 5c medium, 3 for 5c; Lge. 2 for 5c

BLACK RUBBER WHEELS	PLASTIC WHEELS
1/2" 3c pr.	(Lightwt) per pr.:
3/4" 5c pr.	1" 2c; 1 1/2" 4c;
7/8" 7c pr.	1 1/2" 7c; 1 1/2" 10c

ALUM. TUBING	Sheet alum. per ft.
per foot	.003-.005 .25c
1/32 or 1/16 8c	.010 .35c
3/32 or 1/8 10c	1/16 6x6 .35c
5/32 or 3/16 15c	Alum. Wash, 6 shiny, for covering, etc., 12" wide, per ft. 15c

ALUM. ANGLE	
1/2x1/2x12" ft.	25c
1/4x1/4x12" ft.	35c

SKYWAY KNIFE 6" All-Metal 50c Value **10c**



AT ALL DEALERS. By Mail—complete knife and 2 extra blades post-paid 35c

SUPER PLANS $1.00
ACCURATE DETAILED REALISTIC
Any Packet or Folio

CONTROL LINE 1"=1'
Any Class "B" or "C"

PACKET NO. 10	PACKET NO. 13
Typhoon	Spad Fighter
Vought Corsair	Fokker DV11
Spitfire 1X	Sopwith Camel
Focke-Wulf 190	Nieuport 17C1
Mustang P51	Fokker DV111
PACKET NO. 11	**PACKET NO. 14**
Hellcat F6F	Piper Skycycle
Airacobra	Globe Swift
Curtis P40	Ercoupe
Zero	Johnson Rocket
Thunderbolt	Culver Model V
PACKET NO. 12	**PACKET NO. 15**
Hawker Tempest	Gee Bee Racer
P38 Lightning	Fokker Racer
Kingcobra	Wendell Williams
Dauntless SBD5	Roscoe Turner
	Howard Ike

SCALE THREE VIEWS 1/4"-1'	
PACKET NO. 1	**PACKET NO. 4**
Typhoon	French Spad
Vought Corsair	Fokker DV11
Spitfire 1X	Sopwith Camel
Focke Wulf 190	Nieuport 17C
Lightning P38	Fokker DV111
P-40N	British SE5a
Mosquito	Albatross
PACKET NO. 2	**PACKET NO. 5**
Hellcat	Flying Fort
Zero	Marauder
Stormovik	Mitchell B25
Thunderbolt	Liberator
Mustang P51	Lancaster
Airacobra	
Avenger	
PACKET NO. 3	**PACKET NO. 6**
Hawker	Culver-V
Airacomet	Seabee
Black Widow	Piper Super
Hurricane	Aeronca
Kingcobra	Voyager
Nazi ME 109	Globe Swift
Dauntless	Ercoupe

ANY CLASS "A" or "B"

FOLIO NO. 1	
Knight Twister	Gee 38
Tethered Trainer	Culver Cadet
Helldiver	Pusher Pursuit
	FOLIO NO. 3
Hep Cat	Stahl's Corsair
Gnom Yankee	Bob Cat
FOLIO NO. 2	Flying Lab
Hall Racer	Copperhead
Hill Special	Could Be

GAS MODEL ACCESSORIES

Champion Spark Plugs 3/8 or 1/4 50c
Solderless Plugs or Tip Jacks ea. 15c
Battary Boxes—sm., med., Lge. 45c
Motor Mounts—aluminum; Med. 40c
Adj. motor mounts.....$1.00
Hardwood motor mounts:
3/4x3/4x6.2 for 5c | 5/16x3/4x6 ea. 3c
3/4x3/4x6.2 for 5c | 5/16x3/4x9 ea. 4c
3/4x3/4x12 ea. 5c | 5/16x3/4x12ea. 5c
Condensers, best qual. 20c; Metal 35c
Terminal Clips 1/8" 10c; Med. 2—5c
Spaghetti Tubing 1/16" 2 ft.—10c
Toggle Switch 50c; Lightweight 35c
SAE 70 Oil—1/2 pt. 30c, Pint 45c
Skyway Hot Fuel per pt. 50c; per qt. 85c
12" High Tension leads—Best—15c
18 strand Hook-up wire 3 ft. 15c
20" Booster Leads Special . Pair 59c
Masking Tape 1/4x36"—Instructions 5c
Alligator Clips or Tip Wire each 10c
Neoprene tubing 3/32" opening 25c ft.
Plywood—1/16, 1/8, 3/16, 1/4 50c ft.
"D" Control Tank.....$2.50
Shock Absorb Land Gear.....2.85
Solid Brass Flywheel.....1.50
Universal Plug Wrench......25
Bell crank, metal.....10

NEEDLE VALVE
Universal .75
Flexible 1.00

RUBBER WHEELS

OILPROOF Neoprene Sponge	TRUXLER Pneumatic Tires
1 1/2" pr. 35c	2 1/2" 60c
2" pr. 40c	2 1/4" $1.00
2 1/2" pr. 80c	3" 1.25
3" pr. 60c	3 1/2" 1.50
3 1/2" pr. 70c	4 1/2" 1.95

PLASTIC SPINNERS

1 1/2"-3Bc 1 3/4"	45c
2" 2Bc 2 1/4"	50c
SOLID DURAL 1" or 1 1/4" ea.	30c

COILS

Aero	$3.00
Super-Aero	2.50
New WILCO	1.50
Smith	2.75
SKYWAY	1.25

MUSIC WIRE

.014	3 ft. 2c
.020 .028	3 ft. 3c
.034 .040	3 ft. 4c
.049	3 ft. 5c
1/16"	3 ft. 8c
3/32"	3 ft. 15c
1/8"	3 ft. 20c

TIMERS

Hillcrest	$1.25
Austin	1.50
Clockwork	1.98
"U" CONTROL Wire on Spools! 100'	.65c

BRIGHT STAR BATTERIES

Penlites	2 for 15c
Intermediate...10c; Flash Light	15c
U-Control or Race-car	50c

POWER PLUS Wet Cell STORAGE BATTERIES

2 volt 'Flight'	$2.75
4 volt 'Booster'	3.50
AC Wet Cell Charger	4.45
Car Charging Stand	1.95

New X-Acto KNIFE KIT $5

3 polished aluminum handles.
12 blades in deluxe case.

No. 1, with 1 blade	$0.80
with 6 assorted blades	1.50
No. 3 heavy serving, 1 blade	.90
with 6 assorted blades	1.00
No. 62, 2 handles, 12 blades	2.00
No. 82, 2 handles, 24 blades	3.00
Xtra Blades, 10c; stripper	1.00
Sander 50c; Coping Saw	1.25
Pin Vise—lge. or small	.75

HOW TO ORDER

Print name and address clearly. Add 5c for insurance. Add 10c Packing cost on all orders up to 18" long. 36" or 5 ft. 20c. POSTAGE FREE IN U.S.A. Money order remittance best. If outside 48 States add 15% to above packing costs. No C.O.D.

GAS ENGINES

MERLIN SUPER "B"—Greatest motor value today! Complete with coil, gas tank, spark plug, condenser..... **$18**

Atom A .099	$15.50
*Aden Ball Bearing A	21.50
*Arden A .099	19.75
Bantam .199	16.50
*Cannon B .300	19.75
*Cannon C	21.50
DeLong B	24.95
*Dennymite C	17.85
Hornet C 60	35.00
*McCoy C	18.00
*MERLIN SUPER B	18.00
Ohlsson B 23	16.50
Ohlsson C 60	21.00
*OK Super 60	21.00
*OK B29 B	18.50
Forecmatic C 59	24.95
*Rocket C 46	22.50
Ram B	10.95
Rogers B 29	11.75
*Thor B	9.95

*With Coil & Condenser.

CAMEL'S HAIR BRUSHES	DOWELS
Small 8c; Med. 10c; Lge. 15c; G.M. 25c	1/16"x12"—6-5c; 1/8"x18" 3 for 5c; 3/16"x18" ea. 4c; 1/4"x18" each 5c

SPRAY GUNS, Small.....98c
Deluxe Sprayet, 2 Jars.....$1.98
24 PLANE PHOTOS, 5-color, Suitable for framing, 15c
METAL WOODWORKING PLANE Tool Steel Blade, $1 value..... **50c**

BOOKS FOR MODERN MODELLERS

MODEL AIRPLANE DESIGN, by Grant, 328 Pages, 205 illus...$3.75
MODEL GLIDER DESIGN by Frank Zaic. 400 illus., 70 photos, 51 Model Glider plans, 9 full size gliders. Hints Galore.....$1.50
FLYING SCALE MODELS, detailed plans, photos for 16 military models.....$1.50
AIR AGE GAS MODELS. Complete plans, instructions for 21 mighty gas models.....$2.00
WYLAM PLAN BOOK layout & plans Book No. 1 or No. 2, each...$1.50

GLIDERS

JASCO '72"—$3.50; '70"—$3.50; Thermic "80"—$1.00; New THERMIC "C". Improved, sturdy, stable. 80c; TROOPER 65c; SUPER SINBAD 62" balsa construction tow-control $2.50; SINBAD THE SAILER, tow-line launch with spiral control feature, 50" span, $1.25.

FREE FLIGHT GAS KITS

Vet-Aero Sun Duster C	$ 8.95
Wilco-Roger, Dual B	5.95
Comet Zipper B, C	4.95
Berkley Buccaneer B Spec.	6.95
Berkeley Buccaneer Spec. C	6.95
Berkeley C Cavalier 108	15.00
Scientific Ensign B	8.50
Comet Interceptor A, B	3.95
Scientific Larkey A, B	3.50
Scientific Mercury B	3.50
Bay Ridge Mike A, B	2.50
Consolidated Pacer B	3.95
Consolidated Pacer C	4.95
Capitol Super Cruiser C	10.95
Berkeley Super Buccaneer	8.50
Capitol Flamingo C	9.95
Scientific Varsity B	3.50
Eagle Vagabond C	5.50
Eagle Yogi B	3.95
Berk. American Ace 36-A	1.50
Cleveland Baby Play Boy C	1.00
Megow Banahee A-B	6.95
Berkeley Buccaneer 48	3.50
Berkeley Buccaneer A-36	1.50
Berkeley Buccaneer Span. B-C	5.95
Berkeley Cavalier 60-B	5.95
Scientific Coronet A-B	2.50
Consol. Jersey Javelin A-B	3.95
Berkeley Musketeer "54"	3.50
Berkeley Musketeer B	3.50
Berkeley Musketeer A	2.50
Capitol Cub Coupe A	1.95
Cleveland Playboy Jr. B	2.50
Cleveland Playboy Sr. C	3.95
Consol. Roamer A-B	2.95
A.A.M. Silver Streak B-C	15.00
Skyrail C	25.75
Consol. Stratospear	2.95
Master Strato-Streak A-B	2.50
Stanzel's Interceptor A-B	2.95
Berkeley Skyrocket A	2.95

U-CONTROL KITS

AJ Fireball B, C	$10.00
Stanzel Baby V Shark A, B	2.95
Capitol Beechcraft B-C	5.95
Amer. Buzz C	8.95
Berk. Controliner F-4Y	5.95
Scientific Cyclone B, C	4.95
Eagle Dreamer	7.50
Capitol Ercoupe	7.50
Eagle Helicat C	4.95
Ameco Miss Behave B	3.95
Eagle Mustang C	4.95
Sullivan PDQ B-C	5.00
Capitol Skycycle	7.50
Stanzel Super V Shark B-C	4.98
Amer. Streaker B-C	4.95
Consol. Tarpon B-C	10.75
Stanzel Tiger Shark C	4.95
Scientific Atomic B, C	5.50
Comet Whizzer Stan. A, B, C	7.50
Comet Whizzer DeLuxe A, B, C	9.93
AJ Airacobra, all sizes	12.50
Ameco Baby Miss Behave A-B	2.65
Stanzel Baby V Shark A-B	2.95
Cliff's Trainer Kit B-C	7.75
Custom Cruiser	10.00
Duralyt C-B	14.95
Falcon Sportster	5.45
Falcon Speedster B-C	5.95
Knight Twister A-B	7.50
Offenbach Northrup P-61C	12.50
Strato-Cat B-C	5.95
Strato-Kitten A-B	2.95
Tether Sharple B	1.00

Skyway Modelcraft Inc. 426-6th AVE. BROOKLYN 15, N.Y.

The much publicized mercury batteries developed during the war are suitable for filament lighting and have a remarkable life, although their cost is greater than the flashlight cells. The Mallory RMB-3 cell will operate an RK-61 for around 16 hours continuously and is 1" in diameter and .671" high; it weighs 1 oz. The RMBZ—4 cell which weighs 1-1/4 oz. will operate the tube for close to 24 hours. These cells are used in many hearing aids and are made by P. R. Mallory & Co. (Battery Div.), North Tarrytown, N.Y.

For the "B" supply there are numerous hearing aid batteries and other small units used for pocket and portable radios which are suitable for the receiver and transmitter. The Eveready Min-Max 412E (22.5v), 413E (30v), 420 (22.5v) and the 430 (30v) batteries are the smallest and lightest now obtainable and are unexcelled for use in the plane where the current drain is low. The larger Eveready 455 (45v) and the 467 (67½v) batteries are small enough for use in a plane and can also be used as power for a small low power transmitter. The Burgess hearing aid batteries XX30E (45v) and the XX45 (67½v) and the regular W30BPX are also lightweight batteries suitable for either receiver installation in the plane or low power transmitters. Numerous hearing aid manufacturers put out their own batteries and they may be purchased from hearing aid supply shops. Zenith and Sonotone are but two of the companies who have special batteries for sale. Select the battery most suitable for your purpose, considering first the weight, and the current drain second. Note however that it will not pay to save a couple ounces of weight only to have the batteries go dead, thus possibly wrecking your radio control model.

Power for the transmitter may be obtained from three sources: batteries, portable power supplies and AC power supplies. We can forget about the last one as a source of power when out on the field as it necessitates long wires and a heavy bulky case. Batteries may be used if the output of the transmitter is limited to a low power input, in the neighborhood of 2 to 4 watts. For more power there is the choice of either a dynamotor, genemotor or vibrator power supply. All of these require a storage battery to operate although a vibrator supply can be built to run off dry cells.

The Carter Motor Co. of Chicago makes very fine dynamotors for portable work. The P. R. Mallory & Co. Inc. of Indianapolis, Ind., manufacture a vibrator, supply No. VP552, which is widely used for radio control work. Electronic Laboratories of the same city make two vibrator supplies, 601 and 605, which are small, compact and have a low current drain for portable transmitting work. For experimenting with your set during construction it is suggested that an AC power supply be used, or if battery operated use the large "B" batteries.

SMALL ELECTRICAL PARTS—The problem of component parts, such as resistors, condensers, etc., is fairly well taken care of with standard parts. There are, however, small condensers used in hearing aids which are about half the size of standard parts. They can be obtained from most hearing aid repair shops. By-pass condensers are of the tubular type, 5/32" in diameter by about 3/4" long, and the flat type 1/8" x 5/16" x 3/4". Mica condensers approximately three-fourths the size of the smallest regular size are made by Micamold. Small tubular ceramic condensers manufac-

(*Turn to page 52*)

Your Best Workmanship Deserves the New— WASP-TWIN "60"

SMOOTHER ENGINE OPERATION—MORE STAMINA —BETTER BALANCE— EASIER, SURER STARTING —SUPERIOR OVER-ALL RESULTS IN THE FIELD

Price only $35.00 Complete with twin coil and condenser. Fully Guaranteed.

(Pat. Applied for)

STOP worrying about a super power plant for that special model you've planned. Now you can get an engine that looks and acts like the real thing. Simplifies design, balance, mounting and fairing problems; provides downdraft carburetion, with positive-acting needle valve; assures smoother operation at all speeds; has high speed automotive type timer, made for positive adjustments; features bottom exhaust manifolds for lessening oil smear on valuable models—why, if all this makes sense, buy less?

DESIGN CHECK-LIST

Two-cylinder—displacement .60 cu. in.—two cycle, two port, rotary valve—bore .740, stroke .702—bare engine weight 9½ oz.—rpm 10,000 plus—one-piece alloy steel crankshaft, precision ground, with 2 crankshaft main bearings—ball thrust bearing—steel cylinders precision honed, with integral turned steel cooling fins—hardened steel pistons accurately ground to 1/10,000" —aluminum alloy crankcase, con rods, timer and removable high compression heads made by Intracast process (strength comparable to forgings). Con rods heat treated.

See Your Dealer Immediately—If he Cannot Serve You, Order Direct—Motors Shipped Postpaid in U. S. on Receipt of Cash, Check or Money-Order (Please print name and Address).

MICRO MODEL CO.
Dept. MA-11
Box 442, Pasadena 18, Calif.

NEW OFFICIAL RECORD

FREE FLIGHT CLASS "B"

1st FLIGHT	35 min. 44 sec.
2nd FLIGHT (LOST OUT OF SIGHT)	21 min. 05 sec.
3rd FLIGHT	
TOTAL TIME	56 min. 49 sec.
AVERAGE TIME OF 3 FLIGHTS	18 min. 39 sec.

Powered by a DELONG "30"

At the Michigan State Meet, Battle Creek, Michigan, on July 28, 1946, a new free-flight record in class "B" (1946 rules) was made by a plane powered by a DELONG "30". As shown above, average time per flight was 18 minutes, 56 seconds. This is *one* record—the single flight of 35 minutes, 44 seconds is *another* record.

In meet after meet, Delong "30"s are taking planes into the money in free-flight and control line flying. Get in the money with your ship, power it with a Delong "30".

$19.50 at your dealer's

SUPER MOTORS, INC. • 2095 East 19th Street, Cleveland 15, Ohio

GAS MODELERS! THREE BOOKS YOU MUST HAVE $1.00 EACH

It's easy to be an expert when you own these easy-to-read informative books, completely detailed, yet non-technical. Send for them today!

MODEL GAS ENGINE HANDBOOK $1.00

(over 40,000 copies sold)

150 pages of the theory and practice of model gas engine operation. 15 chapters, 83 pictures, cuts, and diagrams. Instruction sheets for 50 different engines. Blueprints, Trouble Shooting.

CONTENTS:

Part 1. Theory—ignition—lubrication—metallurgy—finishes—mathematics—experiments—accessories—72 "don'ts"—trouble shooting.
Part 2. Specifications of 64 engines: class, bore, stroke, H.P., weight, props, fuel, etc., etc.
Part 3. Blueprints & instructions for building two engines.
Part 4. Directory of 57 model engine manufacturers.
Part 5. Instruction sheets for 50 different engines.
Part 6. Dictionary of Model gas engine terms.

These three books were written by Bernard B. Winston, gas model specialist.

GAS MODELERS GUIDE $1.00

(over 15,000 copies sold in three months)

An encyclopedia for the model gas engine enthusiast. How to use your engine in planes, boats and cars.
170 pages—15 chapters—92 cuts, pictures, diagrams.

CONTENTS:

Free Flight Planes: matching plane to motor, balance, inverting, propellers, vibration, ignition and fuel troubles.
Control Line Planes: sport vs. speed, take off, safety control handles, tanks, AMA rules, etc.
Race Cars: classes and types, construction, ignition, operation, timing, etc.
Model Boats: types, engine mounting, fuel and waterproofing, props.
Radio Control
Looking Ahead: flying wing, plastics, props, engines, radio control, batteries, magnets, timers, diesels, jets, rockets, etc.
Winning Contests: complete details.
Club Organization and Directory
Gas Engine Construction Data.
AMA Gas Rules. **Books and Publications.**
Latest Engine Instruction Sheets.
Dictionary of Terms.

GAS MODEL PLANE CONSTRUCTION $1.00

(JUST OUT)

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tured by several firms (Erie, and Centralab Division of Globe Union Inc., Milwaukee, Wis., Bulletins 596 and 630) are now on the market. These are excellent for fixed condensers in tank circuits and in other parts of the circuit where mica condensers were formerly used. The smallest are approximately 5/32" in diameter by 3/8" long and have a capacity of 2 mmfd up. If a variable condenser is required the standard 3-15 mmfd mica trimmer (postage stamp size) with either a ceramic or bakelite base is available.

For the tuning condenser in the transmitter a variety of midget types are available, ranging in size from a two plate 4 mmfd up to 150 mmfd. Due to war surplus, practically every radio supply store has them on hand at a price far below the prewar price. Hammerlund Co. now makes special condensers for VHF circuits as well as any other type you may need. Any of the large condenser manufacturers will be able to meet your needs with various types of condensers.

Resistors of the 1/2 or 1/3 watt size are only 1/8" in diameter and less than 1/2" long. Hearing aids contain midget variable resistances but in most cases are built into the plastic cases and cannot easily be removed.

RF CHOKES—RF chokes are best when made specifically for the desired frequency. The small chart on page 40 gives the optimum size and winding for the 50-54 mc and 144-148 mc band. Use ceramic coated resistors of 10 megohms or higher as the form for winding these chokes. No. 34 copper wire should take care of about 35 ma of current through these chokes and either enameled copper wire or single silk covered wire may be used.

MISCELLANEOUS PARTS—Special components, such as midget variable inductances, are made by the Cambridge Thermionic Corp. of Cambridge, Mass. These are about the size of the end of your little finger and are useful in tone modulated or audio circuits. Small inductances or transformers can be obtained from the United Transformer Corp. of New York City. This company makes some of the smallest commercially manufactured transformers and inductances, which are lightweight and compact and very useful in multi-stage and audio circuits. Hearing aids contain one or more very small transformers but in order to obtain one you must return the old transformer. Since that is out of the question it is best that you make the acquaintance of a hearing aid repair man and have him help you out.

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(*Turn to page 55*)

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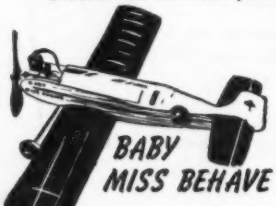

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Experience gained from use of the equipment described in detail in our October issue has shown conclusively that the RK-61 tube is not reliable on 144 mc. Experimental work on this frequency is now under way but until final results are obtained we strongly recommend that prospective builders shift operations to the 6 meter band (50-54 mc).

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C2—10 mmf fixed
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C1—*add* 10 mmf across this unit
C2—change to 100 mmf
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The transmitter antenna will, of course, have to be varied to proper length for the frequency chosen. At these frequencies the RK-61 is absolutely reliable and the entire equipment will be found to give a good account of itself.

Black Magic

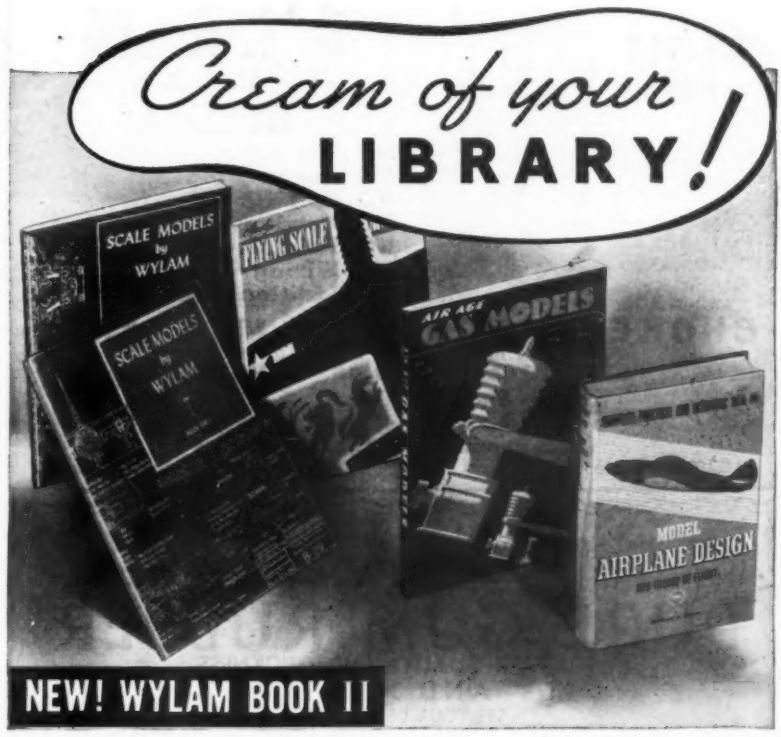
(*Continued from page* 17)

time, there is a rubberband attached to each wheel at the hub, running up through the opening in the wing to the rod in the inside of the fuselage. Now if we pull on this third line, block A is pulled to the rear (Fig. 2) and there is no longer anything preventing the wheels from being pulled up by the rubberbands.

Not shown is the rubberband that pulls the block forward again when the pull on the line is released. This should be easy to visualize however. There is a line attached to the other end of block A pulling exactly opposite from the third line. This line runs through an eyescrew just as does the third line, Only it turns toward the center rib instead of the tip rib as the third line does. There is a similar line connected to block A of the other wheel and it, too, runs toward the center. These two lines are connected by a rubberband in the middle rather than being one continuous line as is the third line. This rubberband should be stretched so that when the two blocks are pulled back, the rubberband is stretched more and tends to pull them forward again. Therefore when the wheels have been pulled up, the pull on the third line is released and block A moves forward (Fig. 3). The wheels are now up.

Turn now to the schematic diagram. We see that as the timer goes in it pulls up rods C and D. When the rod through the eyelets to which the rubberbands are attached is withdrawn the rubberbands fall free and lie limply on the fuselage floor. The wheels are prevented from falling down into the extended position by block A (Fig. 3) which has locked them in the up position. But now, again pulling third line and withdrawing block A, with nothing to keep them up the wheels drop down. The wheels must work freely and drop by their own weight. This is the reverse of the action in Fig. 2. When the wheels are down we again release the pull on the third line, the blocks A again are pulled forward, and the wheels are locked down as in Fig. 1.

It can be seen that the wheels are mounted directly to the spar as are more



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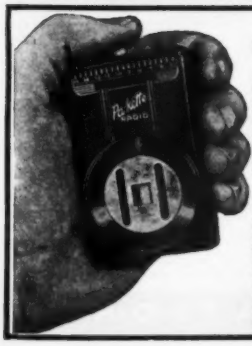

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conventional landing gears (see side view) and thus are amply strong. The two blocks through which the strut runs (one on either side of the spar) are cemented *securely* and hence the wheel can not move backward or forward. Block A runs on guides, *securely* cemented to the spar also (partially shown in top view) which prevent it from moving in any direction except backward and forward. Block A prevents the wheel from moving inward. The pieces opposite block A are non-movable and permanent and thus prevent the wheel from moving outward.

Should the rubber bands to the wheels break in any manner, the wheels will not retract; while two rubberbands connecting the lines to the A blocks (to pull them forward) assure you that it is unlikely both will break, and hence if anything does go wrong it merely means the wheels will not retract. *There is no danger of having to land with the wheels retracted.*

The wheel covers close all but a small portion of the opening in the wing. On the original *Black Magic* we had a set of small wheel covers hinged to wing also (*Thunderbolt* style) to close this opening but they were more trouble than they were worth and were not foolproof.

So far as we know this is the only landing gear that operates by one line only, retracts inward as is done on all modern fighter planes, and is as strong as a conventional fixed gear. It is absolutely practical and saves messy belly landings necessitated by using takeoff dollies.

Block A is 1/2" x 1/2". The length may be scaled from the plan view. Dimensions of these parts and location of rods, etc., are not particularly important, just so long as the system works. The rod to operate the flaps is mounted on former C, and the hook to which the rubberband is attached is mounted on the floor of the fuselage in front of former D, making everything accessible through the cockpit. The block to which the rubberbands are attached is cemented to the inside of the right crutch just ahead of former B. Location of the timer is shown.

WING—The wing, while simple to construct must be built up in the sequence described due to the inclusion of a retractable gear and flaps. All ribs are first cut from 1/8" sheet balsa. Either a box spar of basswood or the laminated pine spar may be used; hence no spar notch is shown in the rib patterns. The box spar entails more work but is considerably stronger for its weight.

Cover the plan with waxed paper and tack it to your work board. The spar tapers from 1/2" in depth at the center to 1/4" at the tip. The wing is built upside down so pin the spar in place inverted. The top of the spar should be flat. Note that the top surface of the wing is flat, the dihedral being provided by the taper in the depth of the airfoil.

Cement the ribs and leading and trailing edges in place. If you can spend the time use slow drying cement rather than fast drying model cement in constructing this model. When the structure has dried remove it from the board and cover the bottom of the wing only with 1/16" sheet balsa. Now cut out the wheel openings in the wing and cement the hinge blocks, etc., directly to the spar. Rig up the third line and the rubberband lines to block A and run it out through the tip rib. Cut out the flaps, hinge them with gauge strips and cement the wire bell crank to them. When you are sure the wheels and blocks A move freely cover the top section of the wing with 1/16" sheet balsa.

(*Turn to page* 59)

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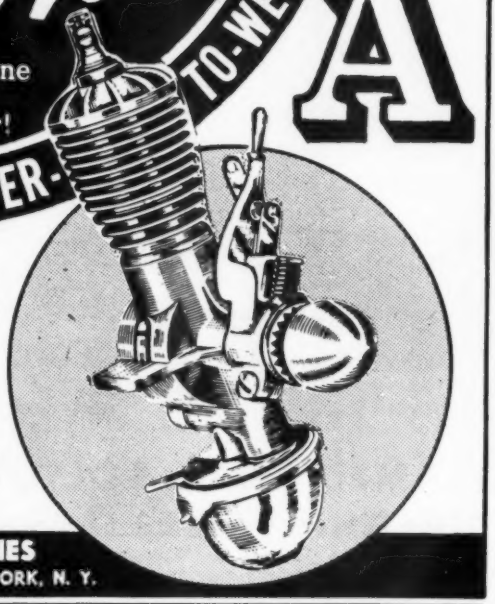

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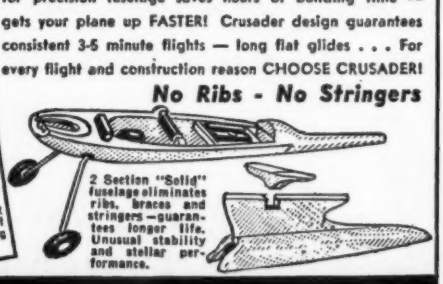

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¾ or 1¼ ea. 5c
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Bombs 1" 10c
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NOSE PLUGS
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½" ..... .04 .03
1 ..... .05 .04 .10
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1⅞ ..... .10 .07 .20
3 ..... .15 .15 .30

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2" 40c; 2½" 50c
¾" 20c; 1" 30c ea.

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1/16x6....5c ea.
⅛ x 18....9 for 5c

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Metal 35c
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CEMENT THINNERS CLEAR DOPE
1 oz. 5c
Large bot. 5c
½ pt. 40c
DOPE ALL COL-ORS 6c; 10c; 40c
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12" BAMBOO
1/16 x ¼, 3 for 5c
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Large can.....10c

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Small 5c; Lg. 10c
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⅛....5c; ¼.. 5c
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PLANE WORLD WAR I, 20"
10 for $1.00

RUBBER
1/16"....10 ft. 5c
⅛" flat .....1c ft.
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PROPELLERS
Balsa 5 to 12" 1c per inch.
Gas 9 to 14" 50c ea.

IMPERIAL MODEL SUPPLY CO.
10 West Camden St., Dept. M11, Hackensack, N. J.

Glue to blocks cut to plan form, shape the tips and finish them with sandpaper. Cement the wheel covers to the landing gear struts with the slow drying china cement used for the rest of the model.

PROPELLER UNIT — The propeller was made of two *Hi-thrust* props. The props are 8" in diameter and have 10" pitch. Notch the two blades and cement securely together. Slip it over a round pencil and spin it. Make sure the tips are running true when viewed from the side; also that the blades are at right angles and their prop shaft holes in line.

EMPENNAGE—The stabilizer is cut in one piece from 1/4" sheet balsa. Glue the tips to the blank and cut it to airfoil shape. The airfoil is a thinned N.A.C.A. 8% symmetrical. Only when the stabilizer has been sanded to shape are the elevators cut out. Round the edges of the elevators and horizontal fin along their hinge line. A wire hinge of the same type as that used on the *Miss Bobby Sox* is employed. This hinge is remarkably free-acting and, unlike a gauze hinge which cement stiffens and cracks, is durable.

FINISHING—There is no shortcut for a superfinish. The finish on the *Black Magic*—far from perfect—took some 150 hours of work.

First fillet all joints well with cement and sawdust. Then sand the entire ship, except for the tissue cover section, with fine sandpaper. Using a good primer-surfacer, start filling in the pores of the wood. Sand with No. 400 wet-or-dry emery, used with lots of water, after each successive coat. After the sixth coat the grain should be covered completely. Continue the painting and sanding process until a minimum of 20 coats of primer-surfacer have been applied. Good primer-surfacers are clear and it will be necessary to use regular white dope to color the ship. If it is desired to color-dope the ship use only 10 coats of primer and five of color dope. When the entire ship has 15 coats of surfacer, or primer and dope, take out every single scratch with No. 400 wet-or-dry emery. When finishing the ship it is best to have the wheels retracted, the flaps up, and the cowls tacked in place. When the ship is absolutely smooth and has a dull gloss, cut along the separation lines for the cowlings, wheels and flaps so that they once more function, the slight crack along these parts having probably been filled in by the primer.

Now is the time to install the controls. Incidentally we made our control rod of 3/16" diameter aluminum tubing and flattened the ends for bolting it to the control plate and attaching it to the elevator. Hold the rudder in place and cement the tip on permanently. Sand smooth the line where the two are joined.

FLYING—The *Black Magic* is flown in a clockwise circle which makes it unnecessary to offset the rudder to extremes. Flying in this direction permits a several mph increase in speed.

The landing strip must be absolutely smooth. Due to her small diameter wheels the *Black Magic* noses over easily if the flight strip is rough. We flew our job from an outdoor track at New York University. The first test flights should be conducted without retracting the wheels. When using a high pitch prop the model must be "whipped" into the air. We tried J.A.T.O. with limited success trying both Ray Rocket units (carbon dioxide "sparkettes") and various gunpowder charges. The sparkettes fizzed out almost instantaneously while the powder units did not develop sufficient power to warrant their

Monogram's "Whirlwind"

ENGINE AND IGNITION INSTANTLY GET-AT-ABLE

You'll go for the Whirlwind hinged engine cowling. Lets you get at engine and ignition equipment pronto! Flip open the cowling to gas up, check wiring, change batteries, even warm up the engine. Then snap the doors shut and fly.

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Sensational New Control Line Flyer — Features Fly - Ability Speed, Ruggedness, Accessibility and the Last Word in Sleek, Beautiful Lines!

TOPS IN KITS

Balsa Body— Completely Finished

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Wire Parts—Fully Formed

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Two Picture Plans that are a joy to work with.

Yes Sir! You'll get plenty of thrills with the WHIRLWIND. It's engineered to give you everything you ever wanted in a magnificent control line flyer—amazingly easy to build—simple to fly for beginners, but with the snappy response to control that experienced flyers demand.

Completely finished balsa body, fully shaped and hollowed out. No carving required. Finished wing panels shaped to air foil section, makes perfect construction easy. Engine, coil and batteries mounted near center on hardwood shock-proof bearers. Control wires inside wing. Wing span 30 in. Overall length 24 in. WHIRLWIND accommodates practically any size engine. Start building this grand flyer soon.

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The Super Sunduster is the ultimate in gas model achievement. It is the finest, cleanest model ever presented to the American model builder. Its structural and aerodynamic design outclasses any of predecessors.

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use. We'll be glad to hear from anyone experimenting along these lines.

The flaps should be adjusted to lower 10 seconds before the engine cuts. The ship can then be brought close to the ground at slow speed and when the engine cuts it will settle without a spar-cracking jar.

When you have the feel of your ship rev up the engine and snap up the wheels. With the wheels up and a *Forster* 29 or *Phantom P-30* up front the ship will easily hit 80 mph. We've never tried it with any C engine except the old *Mighty Midget* which is no more powerful than the two B engines mentioned. With the world's record now in the 125 mph region (at the time of this writing) you modelers really have something to shoot for.

Slicker 3

(*Continued from page* 33)

the speed and the airfoil used.

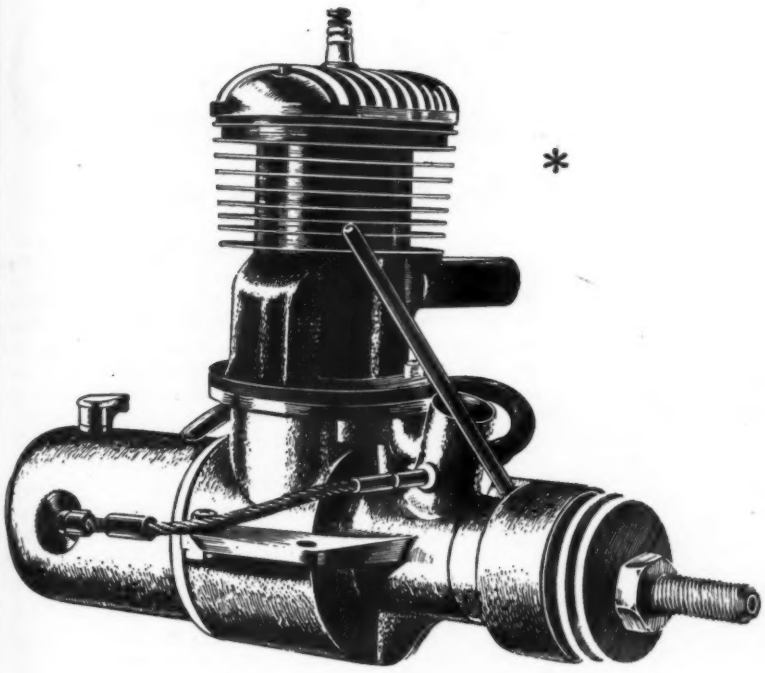
The tip, laminated to take advantage of grain structure, is cut to shape from 1/8" sheet. The trailing and leading edges are roughed to shape before the wing is glued. The two halves are constructed, then sanded to shape, fairing the outline to conform with the airfoil. 4-3/4" dihedral is put in by laying one side flat and propping up the other side 9-1/2"; the spars are allowed to overlap, providing more area for cementing. When dry, cement the piece of 1/64" celluloid to the lower surface. This incidentally is a new type of construction which will take all the knocks and still stand up, as the celluloid is much stronger than balsa sheet which we formerly used. (The author is indebted to Frank Parmenter for this little tip.)

Another celluloid strip is cemented to top of the trailing edge to protect it from the rubberband.

The mount platform is now built to fit the underside of the wing, then glued in place using several coats of cement for a good strong joint. Be careful when cementing the platform in place for it must be accurately lined up with the rest of the model. When dry, insert the 1/8" dowels for the rubberbands and glue in place. The wing is covered with yellow tissue and doped with two coats of clear dope.

HORIZONTAL TAIL—Sixteen ribs are cut from 1/16" balsa and one from 1/8" balsa. The 3/16" x 3/4" soft balsa trailing edge and the 3/8" square leading edge are shaped before they are glued in place. Assemble the entire tail; after cement dries, sand overall to fair the leading and trailing edges and to remove any bumps that may be left from glue. The 1/64" celluloid is then applied to the top of the centersection. The end plates are cut from 1/16" hard balsa, sanded to shape, covered with tissue and then glued in place after the tail has been covered with tissue and doped. The tail is now fitted to the fuselage. Be certain when doing this that you mount it so there is no incidence when finished—*this is important.* Next install the two dowels for the tail rubberband, cementing them in place. Drill the hole for the motor dowel, slip it in place, and with the exception of installing the rubber motor the ship is finished.

Twenty strands of 1/4" flat brown rubber 46" long are used for power. The rubber will take 700 winds easily if it is well lubricated. This will result in a 40 to 45 sec. motor run that will really get your model upstairs.



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Precision super-porting makes possible unusually high speeds.
New system of pressure lubrication assures long life.
Easy starting. Cool running.

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GREAT BEFORE THE WAR—*Even Greater Today!*

"YONDER" WINNERS AT THE LEBANON, PA., MEET. Left to right: Bill Hewton, Phila., 1st in Juniors; Norm Van Horn, Phila., 2nd in Open; George W. Hess, Contest Director; Walt Wilson, Ardmore, Pa., 1st in Open, and Robert Gassert, Lebanon, Pa., 1st in Seniors.

BE sure to get the "YONDER," and these other winning Wilport Models—ArdenT "A"ir (Gas) $2.00—"PEP-ER" (rubber-controlled) $1.85—"TORY" (rubber-controlled) 85c. See your dealer today—save 25c postage.

WILPORT MODELS, 212 DARBY ROAD, HAVERTOWN, PENNA.

In the 10th Annual Lebanon, Pa., A.M.A.-Sanctioned Contest (Aug. 24th) the sensational contest-winning

YONDER

took the following top honors:

1st *in the Seniors!*

1st *in the Juniors!*

1st and 2nd *in the Open!*

Other Wins include:

1st, Willow Grove, 1940

1st, Phila. Meet, 1940

1st, YMCA Meet, Maryland, 1946

IT'S an A.M.A. Class "D" Contest Stick Model with 12 EXTRA features, including Built-in Incidence, Built-in Down Thrust, and Soaring Wing Airfoil. Span 50", length 38", weight 7⅛ oz. Kit without rubber..... $1.50

DELUXE Kit—with enough rubber for 24 strands..... $3.75

Newsletter

(*Continued from page 6*)

Rice, senior advisor to the Toledo, Ohio, *Model Manifers* and an aviation writer himself had prepared some suggested bylaws for such a group prior to the war, but before anything could be done along these lines hostilities interrupted.

The suggestion has been advanced that everyone now engaged part time or full time in writing, editing, photographing or disseminating information on model aviation get together and establish a formal organization, know possibly as the Model Aviation Press Association. Membership would be open to model writers including those responsible for the many excellent club bulletins that are being published today. The Academy of Model Aeronautics offered to maintain the membership lists and any mailing of "MAPA" bulletins if such a group does get set up. The National Aeronautic Association provides this same service to the senior AWA organization.

• •

A RATHER startling result came to light recently when an original design contest was announced by the AMA. Despite widespread publicity and the setting up of a trophy of no mean proportions, only a handful of entries were secured. Obviously the trend in recent years has been to kit models or designs appearing in the model press by noted contest flyers. We have no quarrel with kit jobs; the manufacturers are to be commended if they can put out kits with designs and materials of such quality and low cost that it is not worth the modeler's while to sit down and dream up his own crate. However, we do like to see original thinking and feel that this sort of activity should be fully encouraged. "Design Forum" in this publication is a mighty good idea. Perhaps that will lead the way back to a lot more "self-designing."

It might be a good thought for next year's contests to offer awards for "original design" entries. Of course it would be a tough job to figure where the kit design leaves off and original thinking begins. And the judges of such an event would really have to know their kit models. But perhaps someone in MAN's large audience of readers may have an idea or two. How's about it, fellows? Any suggestions on how to easily judge an original design event for flying models?

BY THE WAY, we came across a clipping which we have been saving just for this column. It is from Henry McLemore's syndicated newspaper humor column which is distributed by the McNaught agency. It seems that someone introduced Mr. McLemore to model airplane building. And in case you missed his column we'd like to quote a paragraph or two:

"The first thing I tackled was the Vultee *Vanguard*. I got a nasty shock when I pulled out the blue print that accompanied the parts. It was bigger than a horse blanket and resembled the final examination for honor students at M.I.T. or California Tech. I looked at the box to be sure I hadn't been given the original design for Boulder Dam. Knowing that before I mastered the intricacies of this layout, Cousin Fred, aged 9, for whom the Vultee model was intended, would have children of his own and look pretty foolish flying it in a vacant lot, I shelved the project in favor of a Hawker *Hurricane*. I chose the *Hurricane* because on its box was plainly stamped 'Simple in construction. Any child can make it.'

"Well, all I have to say is that any child who can is a slacker if he has not quit kindergarden or grammar school and gone to work for the Government. . . . His country needs him, because there can't be more than 10 or 12 engineers in the world with enough background to handle such details.

"Up until now . . . this toy has cost me around $15. The card table, which I turned into a workbench, was the first item of expense. I was whacking away at a propeller when the knife slipped and almost cut the table in two. A pair of scissors (the only decent ones in the house) fell apart on a wing job and a dozen new razor blades have gone into the whittling of the fuselage. A suit of clothes is all but ruined by . . . cement spots, and there is no telling how much iodine and bandages I have used in repairing cut fingers.

"There have been open threats of sabotage from the neighbors who object to living next to an industrial plant which they say is the most profane in history."

Mr. McLemore goes on, but the story becomes so sad we cannot bear to repeat it here. Suffice it to say that Mr. McL., while a nice fellow, just doesn't seem to have the stamina for model aviation.

Tell you what, Henry—kites are easy. Go fly one!

Completely New!

1947 TORPEDO Special

ADVANCED DESIGN!

Ideal for U-control or free flight. High turbulence cylinder head; tapered fuel transfer port; 180° exhaust porting through twin stacks; centered beam or radial mounting; fuel tank permits mounting motor in any position; positive friction-lock needle valve—no other Class B motor has so many advantages. Each motor is completely tested and fully guaranteed—final assurance that your TORPEDO SPECIAL will give *you* the record breaking performance for which it is noted. *Your HOBBY DEALER will be proud to sell you a* TORPEDO SPECIAL. Only $18.50 less condenser, coil.

TORPEDO SPECIFICATIONS

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- **Piston: Meehanite, ground to 5 RMS finish with skirt relief. Tapered fuel transfer permits greatest vapor expansion to top of piston.**
- **Bearings: Naval bronze for both crankshaft and connecting rod.**
- **Connecting rod: Aluminum alloy die cast. Upper end attached to piston by Naval bronze wrist pin.**
- **Timer: Fully enclosed.**
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Can the Props THEY use pass the "A.S." test?
*Airfoil section
Judge for YOURSELF!
". . . the efficiency of any propeller depends largely upon its cross-section . . ." The sections below show the comparison between our prop and a section of an average of other leading brands.
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50% DIA.
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AVERAGE OF OTHER PROPS
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For efficient airfoil sections and wide "Hi-Reynolds No." tips, buy Mercury Gas Props.
Priced at 35c and 40c
A NEW Sensation by COMET!
THE FLICKER
CONTROL MODEL
KIT T9
$3.95
SUITABLE FOR CLASS II, III and IV (Class "A", "B" and small "C")
Designed by DUANE WEBBER
THE FLICKER . . . A NEW ADDITION TO THIS FAMOUS LINE OF COMET GAS KITS:
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And that isn't all—it's easy to fly and easy to handle—the upper shell snaps off for easy access to ignition.
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World War I

(*Continued from page* 38)

much difference what the airplane was originally designed to do; it usually wound up its career doing every conceivable job. In its primary and designed condition, the Spad 11 was intended to provide pilots of the Tricolor with a self defending reconnaissance machine capable of doing a good liaison job without pursuit protection. And as such it was a good performing airplane for its day, capable of a top speed of 116.5 mph at sea level, 112 mph at 6500 ft. and 110 at 9,800 ft. Ceiling was 20,800 ft. and full throttle endurance at sea level was 2 hrs. 15 min. Climb, too, was good for a 1917 two seater. The Spad 11 reached 6800 ft. in 7 min. 35 sec. and 13,100 ft. in 17 min. 30 sec.

But when the headquarters-desk pilots began to order installations of flares, additional armament, landing lights, bomb racks and other sundry items, the 11 began to react like a cornered animal. As the extra equipment was added, the S-11 became longitudinally unbalanced; it stalled easily if the nose were held much above the horizon, climbing turns almost always resulted in wild side-slips or spins, and performance dropped appreciably.

Consequently the Spad 11 worked up a bad reputation among the pilots who flew it and the observers who were commissioned to perform a specific task under heat of battle. In its original form the ship's empty weight was 1485 lbs. and it carried a total load of 825 lbs. including fuel and oil, the crew, armament and miscellaneous items. Gross weight was 2310 lbs. which gave a wing loading of 7.16 lbs. per sq. ft. and a power loading of 11 lbs. per horsepower, according to factory specifications.

Redesignation and Performance

The Spad 11 had been in service several months when it was decided to improve its performance by installing a more powerful engine, and by limiting its duties strictly to army observation. Happily, the *Hispano-Suiza* engine, at once diverted for the up-and-coming Spad 13, was replaced by the *Lorraine-Deitrich* type 8Bb which delivered 250 hp. at only 1650 rpm. At the same time the airplane was redesignated Spa. 16A2 but retained the same dimensions, construction and appearance of the type 11.

Although heavier than its predecessor, the 16's additional power raised the sea level top speed to 119 mph. At 6500 ft. speed dropped to 115, and at 9800 ft. 112.5 mph. was the limit. Weight empty was 1526 lbs., weight loaded 2350 lbs., providing a power loading of 9.46 lbs. per horsepower and a wing loading of 7.28 lbs. per sq. ft. Fuel sufficient for a 1 hr. 45 min. flight was carried. The Spad 16 climbed to 6500 ft. in seven minutes flat and to 9800 ft. in 11 min. 50 sec. But from there on the power curve of the *Lorraine* engine flattened out and 31 minutes were required to reach 16,400 ft., the Spad 16's service ceiling.

The Spad 16 also was equipped with the *Lorraine-Deitrich* 8Fb engine of 236 hp at 1650 rpm, an example of which was tested at Dayton, Ohio shortly after the close of World War I. Equipped as a corps observation plane, this particular model was found to have a top speed of 116.5 mph at sea level at a gross weight of 2044 lbs. At 6500 feet the speed decreased to 110 miles and at 9800 ft. the speed was just 104 mph. Because of its greater weight, the *Lorraine* 8Fb powered Spad

is possessed a poor climb and ceiling. 6500 ft. was reached in a little less than 10 min., and 38.5 min. were required to reach 13,600 ft. Absolute ceiling was 15,400 ft.

Flight Characteristics

In spite of the variations in weight and engine power, handling characteristics of the Spad 11 and 16 were much the same. Like all Spads, the two seaters were best taxied with the stick forward to relieve the weight on the tail skid. Although boggy and slow turning on the ground they taxied without difficulty in a strong wind.

Both types took off easily after a comparatively short run and climbed to nearly 1000 ft. the first minute at a very shallow climbing angle. Once in the air, the planes were well balanced in all three directions and were easily maneuverable. In the approach to a stall, however, there was little or no warning—the nose suddenly dropped with a tendency toward spinning which varied with altitude. In straight and level flight little effort was required on the part of the pilot. Stick forces, even during violent maneuvers, were light and the airplanes were little affected by bumpy air.

In a glide the 11 and 16 were slow and steady, and lost altitude very slowly. Landing was accomplished easily with no tendency to drop a wing, noseover, or groundloop. The landing run was very short because of the braking action of the heavy tail.

Construction

Except for fine details brought about by differences in powerplant and interior modifications effected by assignment to various types of work, the Spad 11 and 16 were identical. Official sources give the upper wing span as 11.22 meters with a chord of 1.53 meters, while the lower wing span was 10.90 meters and chord 1.43 meters. The upper wing was in one piece, made up of two spars with ribs spaced 190 millimeters apart. The two piece lower wing was similarly constructed, with ribs spaced 175 millimeters apart. False ribs in both wings on the upper surface extended from the leading edge to the front spar.

Both wings were swept back 6°—a Bechereau departure—but there was no dihedral. Incidence of the upper wing was 2.8° at the center and washed out to 2.5° at the tips while incidence of the lower wing was constant at 1.5° throughout the span. Unbalanced ailerons fitted only in the upper wing were hinged to an auxiliary spar. Interplane struts were made of wood, streamlined in crossection and tapered in profile. Their fittings were attached to a steel tube carried inside each strut.

Empennage of the Spad two seaters was typically Spad, consisting of a one piece horizontal stabilizer attached to the upper longerons, a divided elevator, a triangular fin and unbalanced rudder, all fabric covered. The stabilizer, braced externally to the fuselage by a strut, had a lifting airfoil section and was constructed of a mixture of plywood, solid spars and stringers. The stabilizer was set at zero degrees incidence. The elevator was made up of a steel tube leading edge which hinged to the trailing edge of the stabilizer, routed ribs, and a wire trailing edge. Vertical surfaces followed the same constructional pattern except that a symmetrical airfoil section was used. The vertical fin was wire-braced to the stabilizer and to the fuselage.

For some unknown reason the Spad

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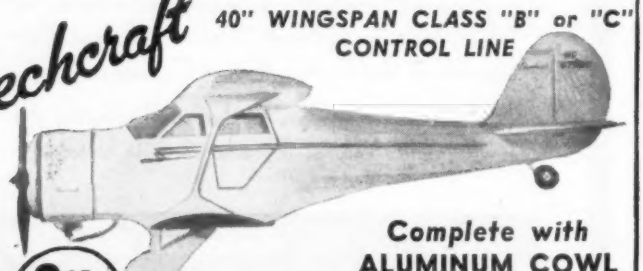

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two seaters were not fitted with firewalls. Instead the pilot's cockpit was separated from the engine by a linen curtain. This permitted engine smoke, heat, oil and dirt to accumulate in the cockpit and no doubt caused a great deal of discomfort in flight. The engine was mounted on parallel bearers of wood, connected to the fuselage structure by supports of three ply wood reinforced by angles of stamped aluminum alloy. The engine section was entirely covered in with sheet aluminum and terminated in front in a circular radiator with shutters for regulating the flow of air. The engine section was the only point on the Spad 11 and 16 where they differed obviously for purposes of recognition. The *Hispano-Suiza* engined Spad 11 was nearly flat-sided in the engine section. The exhaust stacks came directly out of the cowling and the entire front end was rather neatly arranged. The Spad 16 nose section lines, however, were broken by bulging covers which fitted over the *Lorraine* engine's two banks of cylinders where they protruded beyond the cowl line. The *Lorraine* exhaust collector was about parallel with the uppermost side fuselage stringer, while the *Hispano* collector was almost parallel with the center stringer.

The circular water cooling radiator in the nose of both types was fed by a tank located in the center section and occupied the space from the leading edge to the front spar. Steam and excess water was carried through an overflow tube projecting from the bottom of the fuselage. Between the two spars in the center section a gravity fuel tank was installed which represented a "reserve" although it was an integral part of the fuel system. The main fuel tank was located under the pilot's seat. In operation, fuel was pumped from the main tank to the auxiliary tank in the center section from where it flowed to the engine by gravity. Pressure was maintained by an engine driven pump supplemented by a hand operated emergency pump. The main tank contained 32 gallons and the auxiliary a little over 2 gallons. An oil tank of 3 1/3 gallons capacity was located in the bottom of the fuselage behind the engine. The oil system operated under a pressure of 30 lbs.

Landing gear struts were attached to fittings on the lower longerons. Each right- and left-hand pair of legs was a single finished unit formed of several layers of wood glued together, shaped and covered with fabric. Front and rear strut bays both carried diagonal bracing wires. Two stub axles rested between two steel spreader tubes covered with fabric. The axles traveled a maximum of 125 millimeters in steel guides, utilizing rubber cord to absorb shock. Tires were 700 x 150 millimeters in size.

Dual controls were fitted in the Spad two seaters. Ailerons were operated by a rocker hung in a partition between the two cockpits. The lower extremity of this rocker was attached to a spanwise tube in the lower wing which actuated the familiar aileron quadrant and strut used on the single seat Spads. The observer's stick telescoped out of the way from a normal height of 53 centimeters to 36 centimeters. A spiral spring held the stick in extended position and a bayonet type lock held it retracted when not in use. The observer's rudder bar was protected from accidental use by detachable covers. Elevators and rudder were controlled by stranded cables running over pulleys. The elevator control quadrant was enclosed within the vertical fin.

The pilot's cockpit contained the usual

controls for engine operation, a map case and the usual flight instruments. Many two seater Spad pilots, especially those flying the 11, removed all instruments except the manometer and tachometer in an effort to save weight. They flew strictly by "the seat of the pants". The observer's cockpit was ringed by a Scarff mount carrying either one or two Lewis machine guns. Six extra ammunition drums were carried in suitable racks. A folding seat also was provided for the observer. Pilot's armament consisted of one synchronized Vickers gun operated from the right-hand engine camshaft. The trigger was on the control stick.

Although generally disliked by pilots who flew them, the Spad 11 and 16 gave good results in action. When the A.E.F. arrived in France during the first World War, the Spad 11 was one of the ships the French were able to supply our forces. Later on a number of Spad 16's were provided for service with American squadrons. One of the most famous Spad 16's is shown in the accompanying illustrations—the one used by General Billy Mitchell on his trips over the lines to see "how his boys were doing".

Air Ways

(*Continued from page* 31)

Jerry Stoloff) and attempt flights from the Verde River. Subsequent motor trouble prevented any notably good flying since the engine, an *Ohlsson 23*, did not have sufficient power for R.O.W. of this particular ship. We hope that by this time an overhauling has solved the power problem and that Mr. Waller enjoyed some nice, cool summer flying.

No. 12 is a U-control twin *Arden* engined job, a *Super Fireball* constructed by Dale Bures, 3342 S. 46th St., Lincoln, Nebr. The well built nacelles hold the motors, coils, condensers and a switch. Each *Arden* has its own ignition system and the batteries are carried in the nose. Dale has included plenty of detail in his smooth ship—wing lights, three guns, gun sight, pilot image with a protective plate set in behind it, an aerial with a small spring on the wire. Finish is natural color trimmed in red with a red pinstripe around wing and tail.

NEWS OF MODELERS

E. White, 8 Alpine Ave., Tolworth, Surrey, England, writes us: "I would very much like to get in touch with one of your readers who is an air racing enthusiast, preferably someone who attended the prewar Cleveland Air Races. I am particularly interested in the race planes from a technical point of view and require information, photos, press cuttings, etc., of racers. . . . In return I shall do my best to furnish any information, photos, plans and books on aircraft which my correspondent might require."

C. McCombe, 5 Jesmond Park West, Newcastle-On-Tyne, England, secretary of the *Society of Model Aeronautical Engineers*, wishes to become acquainted by mail with three or four members of U.S. clubs who would like to exchange letters with several members of his club for a "swap" of club news, ideas, plans, etc. The S.M.A.E. members, ages 17 to 18, are interested in most types of models: gliders, flying scale, gas and diesel engine types.

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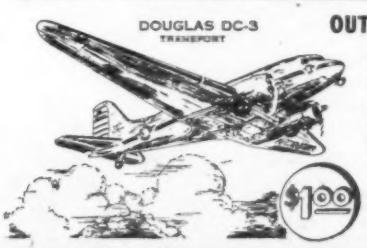

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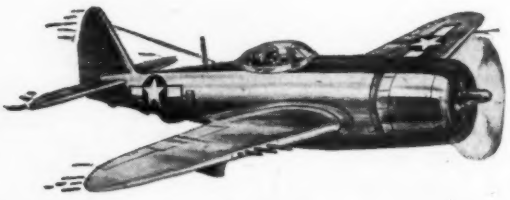

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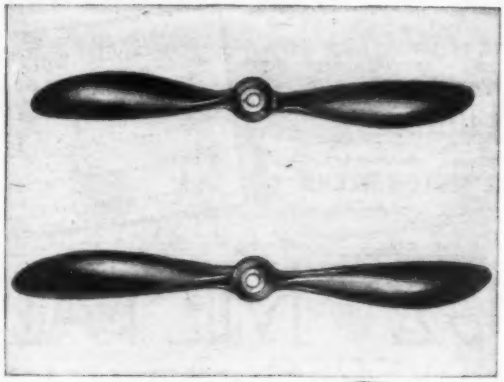

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The following fans of modeling want to establish correspondence with American enthusiasts: Harold Bartels, Calle 20A, No. 37-29, Bogota, Colombia, South America; and Ron Horne, 75 Orbell St., Dalmore, Dunedin N.E. 1, Otago, New Zealand (who prefers to make the acquaintance of a Los Angeles fellow-modeler).

CLUB NEWS

Alabama

Its sponsors, the Exchange Clubs of Alabama, have recorded the following results of the Fourth Annual Miniature Air Carnival held at Birmingham Aug. 4:

Scale Model. Senior Class—1. Milton McLaughlin 2. Bill Joseph 3. Milton McLaughlin
Junior Class—1. Charles Holloway 2. Don McNabb 3. Milton Graves
Free flight Beauty—1. Bill Burks 2. Mrs. Robert M. Morgan 3. B. H. Bishop
Towline Glider—1. George Sarinopoulous 2. Gerald Gartman
Rubber Powered—1. Don McCluskey 2. George Sarinopoulous
Free Flight. Class A—1. Billy Millar 2. Billy Landrum 3. Bob Hudson
Class B—1. Billy Millar 2. Ben Moore 3. Don Murray
Class C—1. Mrs. B. H. Bishop 2. A. F. Lewis 3. E. L. Riley
U-Control. Class A—1. Don McCluskey 2. R. W. Robertson
Class B—1. Billy Millar 2. R. W. Robertson 3. Don McCluskey
Class C—1. Al Strickland 2. Bernard McCluskey 3. R. W. Robertson
Longest Flight—Mrs. B. H. Bishop
Jet Plane Competition—Jack Rawlings
Worst Crackup—Bobby Dovyne
Special Scale Model Award—Ab Spencer

California

The San Francisco Recreation Department has tentatively scheduled an October date for the 20th Annual Recreation Model Aircraft Tournament. Governed by AMA rules, the meet will include hand launched and towline glider, and flying scale events.

THE *South Pasadena Flying Tigers*, a novice club, held its first contest on July 28 with successful results:

Appearance—1. Bob Sisler 2. Charles Roehm 3. Demi Webb
Precision—1. Charlie Roehm 2. Douglas Tanner 3. G. E. Tench and Bob Sisler

ON AUG. 11 the *East Bay Aeronaers* staged their biggest free flight gas contest in years with a prewar array of prizes—engines, trophies and merchandise. Final tallying lists these winners:

Class A—1. Bob Polson 2. John Drobshoff 3. Jack Burke
Class B—1. Joe Poco 2. Dick Chamberlain 3. John Suhr
Class C—1. Doc Crane 2. Joe Bilgri 3. John Sisler

At a semi-annual election, the E.B.A.A. turned over the president's chair to Dick Verba; Vaughn Schultz was chosen Vice-Pres.; Charles Doane, Sec.-Treas.; Charles Hubbard, Sergeant-at-Arms. The *Aeroneers* have established new headquarters at Root's Hobby Hut, Telegraph at 51st St., Oakland.

Three important end-of-summer activities scheduled by the F.G.M.A.C. were:

Aug. 25—Monthly Gas Model Free Flight Contest
Sept. 8—Record Glider Trials
Sept. 15—U-Control

A recent gas meet produced these results:

Class A—1. Roy Gruenwald 2. Marvin Moore 3. Fred Mosier
Class B—1. Roy Gruenwald 2. Ray Balekian 3. Henry Vincent
Class C—1. Ralph Mower 2. Martin Martin

Constituting just about the biggest West Coast modeling news during the season was the first All Western Open Model Aircraft Contest, Aug. 23-26, sponsored

(*Turn to page 70*)

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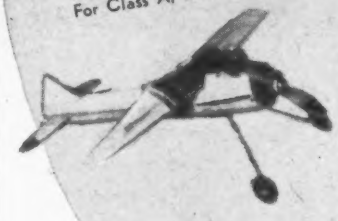

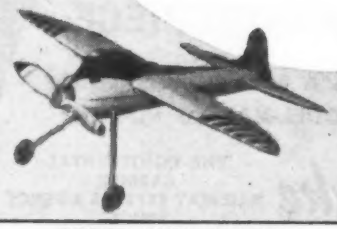

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Bay Ridge Mike	$2.00	Javelin A & B	$3.95
Diamond Demon	2.00	Topper A	3.50
Strato-Spear	2.95	Pacer-B	3.95
Roamer	2.95	Pacer-C	4.95

SLIM JIM BATTERY BOX — Compact litewate aluminum holder, takes 2 pen-lites in line. Distributes weight equally over center of gravity. 40c.

STRONG JIM Engine Mounts — Class A-B 35c pair; Class C 50c Pair

NAVY TYPE SEA-PLANE FLOATS — Complete kit makes 2 strong navy type floats 22" long. Sustain up to 3 lbs. Planks, Tissue covering and nose blocks in generously filled kits, $1.50.

BY MAIL: If no dealer near you order direct. Add 25c per kit for packaging, postage; 50c for Tarpon; 10c Battery Box. Check, Money Order. Don't send cash.

Consolidated

MODEL ENGINEERING CO.
3087 THIRD AVENUE (MA-11)
NEW YORK 56, NEW YORK

by Los Angeles Jr. Chamber of Commerce. Johnny Davis, M.A.N.'s Coast representative, will give readers full results coverage of this important show in a forthcoming issue.

Connecticut

The *Skyliners* of Manchester in cooperation with Manchester Chapter of the Air Power League presented their first annual contest on Sept. 15 at the Willimantic Airport. Limited to AMA licensees only, the program gave modelers an opportunity to compete in the following events: Free Flight—Classes A, B & C; Control Line—Classes A, B & C; Stunt—Combined Classes.

Georgia

Sponsored by the Macon Chamber of Commerce, a large flying circus attracted Macon's attention and participation on Sept. 15. $1,000 in prizes was distributed to winners.

Illinois

The *Balsa Butchers* of Alton are currently engaged in a membership drive and ask that non-club modelers living near Alton contact Donald Belanger, 2222 Brown St., Alton.

DUTCH HESS reports the winners of the *DeKalb Cloud Dusters'* Second Annual Free Flight Meet on July 28:

Class A—1. J. Leeson 2. Reinert Muhs 3. W. Vanderbeek
Class B—1. George Geimeinhardt 2. Paul Lawrence 3. Paul Lindholm
Class C—1. Harry Gunther 2. Tom Abramson 3. Ed Rachenmocher

Iowa

Bob Hoffman, corresponding secretary of the *Sioux Helldivers*, writes that a midwest model contest held at Sioux City on July 28 attracted 80 entrants from four states. Winners:

Free Flight Open. Class A—Robert Swegar
Class B—Joe Backman
Class C—Fred Miller
Senior. Class A—Herb Kotha
Class B—James Nicas
Class C—Warren Obeen
Rubber Powered—Marshall Clelland
U-Control Speed—Theo. Sedgewick
Precision and Stunting—John W. Hamel

Louisiana

The *Shreveport Modeleers Club* in its initial report to "Club News" through H. C. Hilburn, Secy.-Treas., tells us that the club has been organized for five years and lists 62 modelers. A helpful club policy provides for regular instruction courses held in a completely equipped workshop at the Shreveport Recreation Center in Princess Park. Construction and flying activities make up a busy schedule which included a Tri-State Contest on Sept. 8 sponsored by the Shreveport Kiwanis Club. Scene of the meet was the Louisiana State Fair Grounds.

Maryland

The *Hagerstown Model Builders Assn.*, a group of 40 modelers who organized last March, sponsored its first Annual Flying Circus on Aug. 11, an invitational meet. Judges, Hagerstown businessmen, determined the following winner lineup:

Control line—Class A—C. G. Eichelberger
Class B—F. R. Kunze
Spot landing—J. M. Keenan
Class C speed—Carl Rider and Brayton Paul
Hedgehopping—Senior—O. S. Stumbaugh
Junior—Don Saum
Solid Models—Senior—S. Rolfe Gregory
Junior—Don Saum

COMPLETE RESULTS of the *Baltimore Air-O-Ites* Fourth Annual Gas Model Meet, submitted to us by W. F. Bornscheuer and Henry R. Jex, indicate 149 contestants participated, sharing in a $500 prize list consisting of trophies, mo-

(Turn to page 72)

A NEW SPORT!

"Thrill" TO SPEEDS OF 130-140 MPH

POWER ICE BOAT!

MODEL

LIGHTNING

TORNADO

NIAGARA

SUPERIOR

CHALLENGER

DEMON

THUNDERBOLT

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RUGGED IN CONSTRUCTION

POSTCRAFT Pre-Cut plywood bulkheads planked with 100% Balsa.

Formed steel running gear, flexible to withstand shock.

All necessary hardware including formed steel runners resulting in a sturdy indestructible hull and gear assembly.

CONVENIENTLY COMPACT

POSTCRAFT ICE BOAT Uses any A, B, or C engine and features a removable hood, with ample room for coil, condenser and batteries. Overall length approximately 20"

. . . and FAST TOO,

POSTCRAFT POWER ICE BOAT will attain tremendous speeds on ice and snow using Tethered control or free running Radio Control.

COMPLETE KIT $4.95

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At your dealer or by mail add 25c

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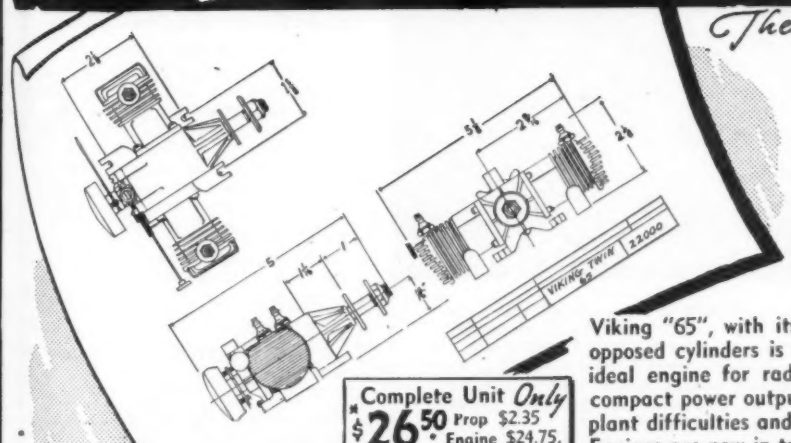
DIVISION OF RIDGEWOOD HOBBIES INC., 196 EAST RIDGEWOOD AVE., RIDGEWOOD, N. J.

At Last! A MODERN ENGINE *Scaled* TO YOUR REQUIREMENTS



Complete Unit *Only* $26.50* Prop $2.35 Engine $24.75, AT YOUR DEALER'S

The New VIKING "65" Twin Cylinder Model Engine

Build your scale model around these specifications and dimensions! The power-packed twin engine Viking "65", enables you to assemble a scale model with a scale engine! This micro-precise engine is easy to start, durable and of high speed and dependability.

Viking "65", with its "short-proof" timer and balanced opposed cylinders is smooth in operation, making it the ideal engine for radio controlled models. Viking "65" compact power output permits you to forget your power-plant difficulties and concentrate on your radio controls. Engines are now in transit to your dealer. Be the leader in your neighborhood with the Viking "65" twin!

*Subject to O.P.A. Approval

SPECIFICATIONS

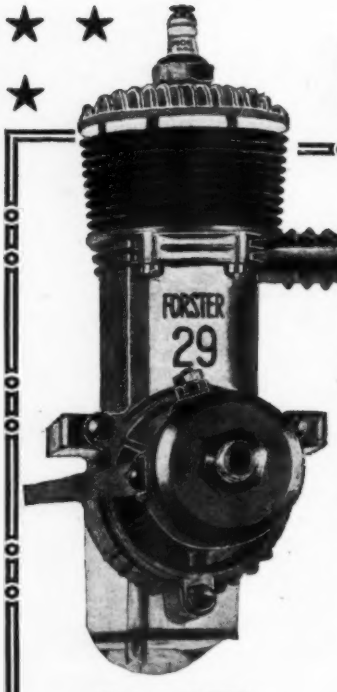
Bore .8125
Stroke .625
Displacement .647
Weight 11 Oz.
½ H.P. at 8500 RPM.

Manufactured By

Macval MFG. COMPANY

A California Corporation

3223 Burton Avenue, Dept. 9-MA. Burbank, Calif.



Among the many good engines on the market today, none is more favorably known for dependable performance, for speed, power and long life than the

FORSTER "29"

The skill and longer experience of the manufacturer show up in the product, have made it the quality engine it is. A long record of first performances have built its enviable reputation, so enviable that imitators look to it for "japanese inspiration." Yet,—the surest and simplest way to get FORSTER performance is to power your plane with the genuine FORSTER "29." Don't settle for less!

BUY IT AT YOUR DEALERS

$24.75
COMPLETE WITH COIL AND METAL CONDENSER

Write for Descriptive Literature

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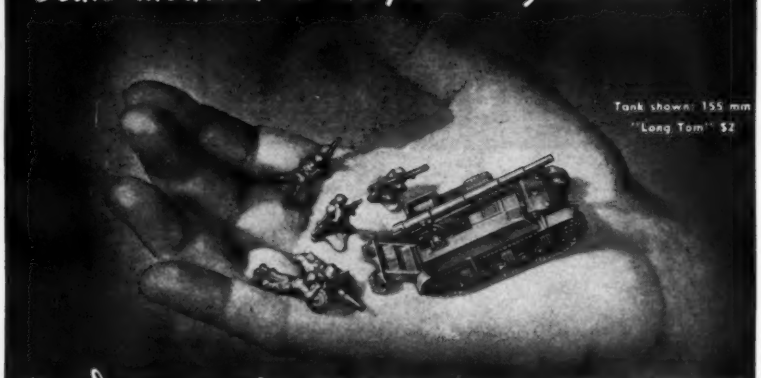
3539 N. Kenton Ave., Chicago 41, Ill.

Scale-modeled to the palm of your hand . . .



Authenticast TANKS AND SOLDIERS!

EXCITING, historic, realistic! Minute perfection in every one of these completed models! Gun turrets revolve, wheels turn; every detail of armament, tracks, bogies, gas tanks, even rivet heads — all precision-cast in solid metal. Over 50 official models of all nations to choose from! Soldiers are realistically posed charging with rifles, firing machine guns, bazookas. Tanks are scaled 1 inch to 108 inches, $1.10 to $2. Soldiers in matching scale, box of 12 assorted, $1.85; box of 12 men and 1 U. S. tank, $3.

Send 35c in coin for illustrated 32-page Authenticast catalog.

OTHER Authenticast MODELS OF U. S. TANKS AND VEHICLES (1/4 ACTUAL SIZE)

Willys Jeep $1.75 | Amphib. Jeep $1.35 | M-26 "Pershing" $1.75 | Scout Car $1.50 | "Weasel" $1.50

COMET METAL PRODUCTS CO., INC. 132-03 91st AVENUE RICHMOND HILL 18, N. Y.

tors, merchandise, etc. Winners and follow-ups were:

Class A—1. W. Smith 2. L. Steger 3. H. Slawter
Class B—1. R. Slawter 2. Thompson 3. H. Souder
Class C—S. Culp 2. B. Barron 3. R. Malion
Beauty—1. R. Lau 2. H. Souder
Handlaunched Glider—1. R. Dietz 2. J. Ripken

Worthy of mention and the attention of other clubs was the *Air-O-Ites'* policy of prohibiting members to compete against their guests in this invitational meet. The system worked out to good advantage and will be used at all further meets. Membership in the *Air-O-Ites* is open once again and those interested should contact W. F. Bornscheuer at 418 N. Charles St., Baltimore 1.

New Jersey

Fifteen members of the *Atlantic City Cloud Chasers* and *Ventor Hot Sparks* played host recently to Edward Soltis of the *Yonkers Gas Birds* at a special meeting held at the home of Harry Lodovico. Mr. Soltis showed movies of his club, the *New York Skyscrapers* and the *Prop Spinners;* the *Cloud Chasers* and *Hot Sparks* reciprocated with a reel of the two South Jersey clubs' doings.

New York

A future issue will carry results of the big time Mirror Model Flying Fair on Sept. 29 at Grumman Aircraft Engineering Corp. airport, Bethpage, L.I. Sponsored by the *Daily Mirror*, the meet attracted nationwide attention and was eagerly awaited by model devotees who saw their chance for some keen competition.

CONTROL LINE enthusiasts in Syracuse have formed the *Syracuse Control Liners*, a club of 18 senior members, and have elected the following officers: Art Simmons, Pres.; D. W. Burke, Secy.; Tom Lewis, Treas. Anyone in this vicinity interested in joining the *Control Liners* and participating in their active flying program should write D. W. Burke, 329 Wellesley Rd., Syracuse 7, or call 5-1644.

THE *Prop Spinners Club* competed in its 8th monthly intra-club contest at Creedmore, L.I., on Aug. 11 with the following results:

Free Flight Gas Combined—1. Skeets Rinehardt 2. Warren Fletcher 3. Malcolm MacLean
Hand Launched Gliders—1. Skeets Rinehardt 2. Warren Fletcher 3. Robert Hatschek

North Carolina

On Aug. 4 at old High Point speedway, *Model Masters* and the local Exchange Club cooperated to present the North Carolina State Championship Model Airplane Contest. Dedicated to the memory of the late Carter Allen of High Point, a member who gave his life in military service, the meet was A.M.A. sanctioned and offered a prize array of $150. Floyd Underwood, acclaimed North Carolina champion, accumulated 200 points during the day. Further results:

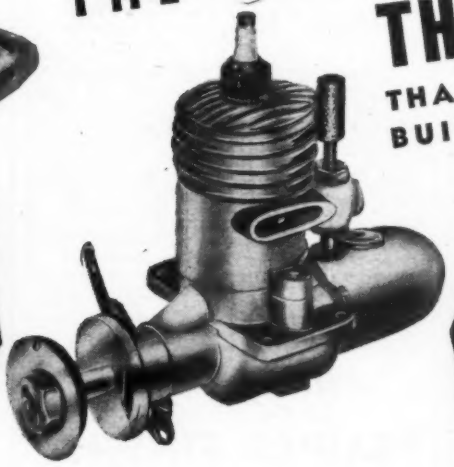
Class A—1. James Field 2. John Blair 3. Harold Alexander
Class B—1. Lloyd Underwood 2. John Blair 3. Robert Deal
Class C—1. Lloyd Underwood 2. Carroll Wheeler 3. Charles Bates

Ohio

Robert T. Hollister, publicity chairman of *Akron Model Plane Builders, Inc.*, Akron's local non-profit A.M.A. chapter, writes us of his new club and the steadily increasing trend toward model aviation promotion in this vicinity. Of especial interest is the wide sponsorship of the A.M.P.B. It is a community-wide effort supported by all five major rubber companies, the Chamber of Commerce, Junior Chamber of Commerce, all service clubs, city schools, city recreation department,

(*Turn to page 75*)

THE MIGHTY, NEW THOR "B" THAT YOU HELPED BUILD IS HERE.



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READY TO RUN
ONLY $9.95
Complete with coil, condenser and fully illustrated instructions.

in KIT form
Fully machined, 5 minutes to assemble - ONLY $6.95
Without coil and condenser
WITH FULL INSTRUCTIONS

TESTIMONIALS

"I am an owner of one of your Thor engines. I think it is a good engine and have gotten many successful flights out of it. The last one was a 2½ mile, 1 hour 40 min. flight which was beautiful."
D. E., Midland, Texas.

"I also want you to know I am very pleased with the Thor engine I recently ordered from you. I'm amazed by the compression that is found in a motor as inexpensive as yours."
B. W., Ann Arbor, Mich.

"I received my Thor engine and am very much pleased with it."
F. G., Clinton, Ohio.

"I have really enjoyed my Thor since I have had it."
E. W., Orlando, Fla.

"Have received my Thor engine and am well pleased with it."
E. C., Norfolk, Va.

"I am really surprised and pleased with my Thor engine. It is really of fine workmanship and materials."
D. J., Sanford, Fla.

"A friend of mine received a motor from you the other day and it runs perfect. Please send me one right away."
R. C., Vestal, N.Y.

"I like the engine very well and it runs good."
S. S., Nashville, Tenn.

"I have gotten very satisfactory performance from your Thor."
G. B., San Rafael, Calif.

"I like the even and steady way it runs much better than several other motors I have owned. It also seems to have plenty of soup for its size."
E. L., Warm Springs, Mont.

"We are in receipt of the two Thor engines we ordered from you recently and are very well pleased with this motor and are enclosing our check for 4 more of these engines."
S. S., Pampa, Texas.

"I am a pleased and satisfied owner of one of your Thor gasoline engines."
S. W., Rutledge, Pa.

"After seeing one of the Thor engines run which was owned by one of my buddies, I reached a conclusion that it was a superior engine for the listed price."
W. P., Del. Co., Pa.

"I am a proud owner of your Thor engine and it runs with clockwork precision."
A. L., Long Beach, N.Y.

"The first ½ dozen were great so now ship me with haste 4 dozen more."
B. H., Omaha, Nebr.

"I am very pleased with my Thor engine."
B. R., Middlesboro, Ky.

"I am very pleased with your engine and hope to have it in a contest in the near future."
A. L., Long Beach, N.Y.

"Have had this engine for about one week now and am having excellent results with it."
O. W., Gulfport, Miss.

"Recently I purchased one of your 1/6 H.P. engines for use in a model plane. It is a perfectly good engine and I'm sure I never saw another one-cylinder job run so smoothly. I should know a little about it since I have been working on aircraft engines for the last five years."
M. C., Elmira, N.Y.

AMERICA'S HOBBY CENTER, INC.

THOR—The Engine that won't be beat in any price field.

The Ideal Engine for all models, planes, boats and race cars!

15,000 already sold.

Just a "twist of the wrist," and she's off—smooth, velveted power. Never lets you down!

This is <u>your</u> engine — powerful, smooth, streamlined. Featuring the newest technical developments in the model engine field. Just a "twist of the wrist" and the Thor starts with a roar. It's as simple as all that!

THOR "B"

The mighty Engine that spells P-O-W-E-R

SPECIFICATIONS

H.P.: 1/6	Displacement: .29
Bore: 13/16	R.P.M.: 300-11,000
Stroke: 9/16	Weight: 4½ oz.

Class B, NAA RULES

JOBBERS! DEALERS! INQUIRIES INVITED!

PLUS THESE EXTRA ADVANTAGES:

- Ideal for free-flight, U-Control planes, boats and midget cars
- Complete instruction book fully illustrated
- Full 30 day guarantee against defective parts
- Easy to start, "a twist of the wrist"
- Steady and consistent running
- High compression ratio for instant starting
- Every part precision engineered to perfection
- Lowest weight of all "B" engines without sacrifice of power
- Streamlined for cooler and longer operation
- New intake design for non-flooding and positive adjustment
- Piston, cylinder and bearing surfaces micro-precision fitted to .0001"
- Crankshaft of polished-ground steel, scientifically balanced
- Special oil grooves for longer life
- 1" bearing surface with forced double lubrication for longer wear
- Uniflow piston
- Integral all-metal tank
- Castings made of new "THOR" alloy. With more heat dissipation and wearing quality than any other engine
- Perma-designed foolproof timer—never needs adjustment—can't slip in operation. Made of Beryllium
- Replacement parts available and interchangeable

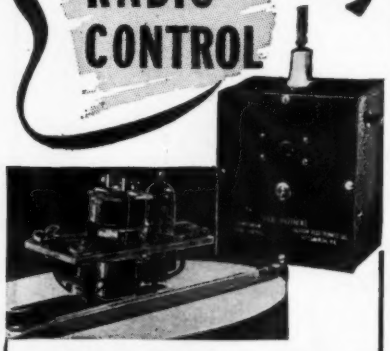
Only our large volume and tremendous production make it possible to give you so much value for so little—only $9.95

SEND ONLY $1.—We Will Ship Your Engine Collect C.O.D. the Same Day; or Send Full Price Plus 25c Extra and We Ship Parcel Post Insured.

(Thor Engines Division) Dept. M116T 156 West 22nd Street, New York 11, New York

Send for FREE illustrated booklet

Championship RADIO CONTROL



★ SMALL ENOUGH for Class B
★ Can be installed in control line models

The last word in scientific plane control by radio! Equipment furnished includes transmitter in black crinkled finished metal case size 4 x 4 x 6", range approximately 2 miles; receiver size 4 x 1⅛ x 2¾" high, weight 5 ounces, operates on 4 Pen-Light batteries (2 ounces); 1-45V. "B" Battery (8½ ounces); and escapement unit size 2¼ x 1⅛ x 1" high, weight 1 ounce (not shown). Also useful in model railroading for radio train control.

Retailing at **$59.50** at your dealers

"ELECTRALINE" INSULATED STEEL WIRE for CONTROL LINE MODELS

$1.50

150 ft. Coil Diam. .011" or .014" State Size Desired

ELECTRALINE—The first and original insulated control line wire. Perfected to R. L. Webber specifications after 2 years of rugged experimentation. Insulated with a tough flexible rust-proof coating.

Attractively packaged with diagrams, electrical hook-up and complete instructions for use with Two Speed Control or cutoff switch.

HI-THRUST PROPS

For Higher Speeds— Longer Flight—

Perfect air-foil section. Sharp, clean edges. Choice of 3 pitches.

PRICE LIST			
Diameter	8" or 9" Pitch	10" Pitch
8" or 9"	35c	45c
10"	40c	45c
11"	40c	50c
12" or 13"	45c	60c
14"	50c	65c

ASK FOR "HI-THRUST" AT YOUR DEALER

R/C R. L. Webber COMPANY
ORDER FROM 5729-31 LAKE ST CHICAGO.44

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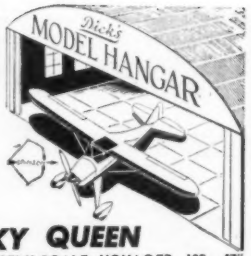
THE CREAM OF MODELS



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FREE! BUILDING & FLYING "DOPE" NOW WITH EVERY PURCHASE

DICK HELPS HIS CUSTOMERS MAKE WINNERS! WON 30 MODEL TROPHIES & IS AIRCRAFT ENGINEER

U-CONTROL		FREE-FLIGHT	
MISS BEHAVE	$ 2.65	LITTLE CHIEF	$ 2.95
STRATO-KITTEN	2.95	MISS TINY	3.25
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FIREBALL	10.00	SAIL PLANE	8.95
CASALAIRE	18.50	PIPER CUB	10.95
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65 MODELS TO CHOOSE FROM. SEE CATALOG

FREE! DTD IGNITION SET WITH EACH MOTOR PURCHASED

A SURE-FIRE COMBINATION!

*ARDEN .099	$19.50	*HURRICANE .24	$19.75
ATWOOD .60	23.50	McCOY .60	35.00
BANTAM .199	16.50	MIGHTY MIDGET .45	24.95
BARKER .60	24.50	OHLSSON .23	16.50
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DELONG .30	24.50	ORWICK .64	32.50
DYNA JET	24.50	PACEMAKER .59	24.98
FLEETWIND .60	24.50	TORPEDO .29	18.50
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*With Coil & Condenser

ANNOUNCING! SKY-CHARGER "SUPER-FINISH"

FUEL RESISTANT DOPE

FINISH NOT AFFECTED OR SOFTENED BY RACING FUELS OR REGULAR MIXTURES!

AVAILABLE IN 4 OZ. FOR .35, 8 OZ. .65

RED MAROON BLACK CLEAR
YELLOW DARK BLUE WHITE PRIMER

AVAILABLE IN 4 OZ. FOR .30, 8 OZ. .50

DOPE THINNER PRIMER THINNER

NOTE: SEE YOUR DEALER FOR SUPER FINISH

JOBBERS AND DEALERS WRITE FOR DISCOUNTS ON "SKY CHARGER"

MOTOR "SNOOD"

Water & dust-proof duck canvas cover. Has zipper for easy installation. Covers timer, prop. & complete engine assem. Small (A&B), large (C) $1.25

G. & H. UNIVERSAL MOTOR MOUNT

All aluminum alloy. Has 15° side and up or down adjustment fits all motors. Long (C), short (A, B) $1.00 pr.

ALL LEADING ACCESSORIES STOCKED

FREE! 25 FEET FRESH RUBBER WITH EACH FLYING KIT

BERKELY, CAPITOL, CLEVELAND, EAGLE, VICTORY

THIMBLE DROME

Midget Racer is 1/24 (1" Model of Champ, Sam Hanks. Also sturdy toy with die-cast alum. body, rubber tires. Instruments. Comes assembled and painted in black, white, green, yellow, blue, red. (Give 2nd choice.) Standard Racer $1.95. Deluxe Racer has chromed exhaust and steering wheel extra..... $2.50

Hi-Way Hi-Baller

Diesel Truck & Trailer Kit, Knee Action, Rear-Trucks, 18 Plastic Wheels. Parts cut 1/4"-1' Scale. only..... 75c

FLASH! HI-BALLER OIL TRUCK (1/4"=1') .75
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MAILING INSTRUCTIONS

Add 15c on orders up to $1.50 for post. & pack. Add 25c on orders over $1.50 for post. & pack. No C.O.D. on motors. Minimum order access $1.00. If delivered in Calif. only, add 3% tax.

DICK EALY
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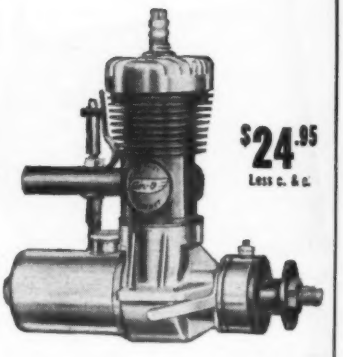
MIGHTY MIDGET WINS top HONORS IN *First* All Western Open Contest



$24.95 Less c. & e.

WATCH this Contest Winner

Competing with contestants numbering up in the hundreds in the first All Western Open contest, Air-O Model walks away with three winning places. This light weight, basic .45 cubic inch displacement design, has been in the limelight ever since its inception. Each engine bench tested with 12" propeller, then additional check-out is made with 10" propeller in excess of 10,000 R.P.M. to insure against high speed misses and point flutter.

Junior Sweepstakes Winner: David Wade
First in R.O.W.: Lewis Mahlen
First in R.O.G.: David Wade

Again Air-O Props Win

Free flight and Precision U-Control

8"	50c
9"	55c
10"	60c
11"	65c
12"	70c
13"	75c

Air-O-Line for U-Control

9" Diameter 10" pitch 75c
10" Diameter 10" pitch 75c

AIR-O MODEL SUPPLY COMPANY
741 NORTH PRAIRIE AVENUE
HAWTHORNE, CALIFORNIA

boards of trade, Women's Chapter of N.A.A. and the Akron *Beacon Journal*.

AS A prelim to the full-scale National Air Races, Aug. 30-Sept. 2, the A.M.A.-sanctioned Junior National Air races were held in Cleveland on Aug. 24-25, sponsored by the press. Nationally known aviation firms contributed $1800 to be used mainly for cash awards in events such as free flight gas, classes A, B & C, rubber powered, fuselage and stick.

Oregon

Salem's *Cloud Chasers* staged an A.M.A.-governed contest on July 28 which included competition in Classes A, B & C. The prize list was made up of model motors, kits and supplies.

Texas

Ray Wiggins of Bivins registers the *Mighty Modelers* on the "Club News" roster, a two-man club which is now engaged in building rubber, R.O.G. and gas kits and planning its first contest. Free flight models are the fellows' specialty and they hold forth in a well supplied club room—outdoors on a 200 acre clear flying field. You Texans in the vicinity who would like to join this pioneer club may contact Ray, Route 2, Bivins.

West Virginia

Wheeling modelers have formed the *Skyblazers*, 35 members strong, who meet weekly at the Kennedy Hardware Co., 1063 Main St.—at which address, incidentally, West Virginians in and around Wheeling may communicate with Robert H. Kennedy to sign up with the *Skyblazers*. The club has run off several meets and has competed in local Exchange Club contests.

England

"Club News" readers may determine results of the *Pharos Model Airplane Club* (Middlesex) versus the *Cleveland Balsa Butchers* in a decentralized contest on July 14 by comparing the English club's times, given here, against the *Butchers'* times published in last month's column:

Rubber Powered Fuselage—total time of 3 flights each contestant:
Mrs. A. M. Buckeridge—7 min. 54-6/10 sec.
A. C. Armes—6 min. 42-5/10 sec.
J. P. Buckeridge—11 min. 54-2/10 sec.
Total elapsed time, team of three—26 min. 31-3/10 sec.

Towline Glider—total time of 3 flights each contestant:
R. V. Hobbs—14 min. 20 sec.
P. Lee—5 min. 36-9/10 sec.
J. Partington—5 min. 25-6/10 sec.
Total elapsed time, team of three—25 min. 21-5/10 sec.

Grand total elapsed time, both events—51 min. 52-8/10 sec.

Ireland

James M. Wade, a contestant, sent us an account of results of the important Irish international competitions held at Baldonnell Aerodrome near Dublin on June 23. Rubber powered models competed for the Wakefield trophy; the British team took first three places in this event:

1. Robert Copeland (holder of world's record for rubber propelled flight of 33 min. set up in Yugoslavia in 1933). Time—234.7 sec.
2. J. Hinks, Associated British Aeromodelers. Time—101.98 sec.
3. R. Calvant, A.B.A. Time—97.4 sec.

A cup was presented to Roy Hanna by the National Agricultural and Industrial Assn. for the best performance by an Irish-designed model (flight time 87 sec.). The gas model contest shaped up with these results:

1. H. Charles 2. E. W. Little 3. S. Lanfranchi

Mr. Wade reports that model activity is

(*Turn to page 77*)

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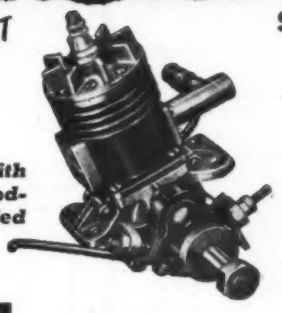

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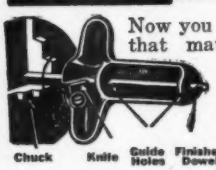

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1/8 x 3/16		.70
1/8 x 1/4		.95
1/8 x 3/8		1.35
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now really getting under way in Ireland with the formation of several clubs. Though nearly all these model groups are located in Dublin and Belfast, some will soon be organized throughout the country, all abiding by rules of the Model Aeronautics of Ireland, governing body of the hobby's activities.

South Africa

Readers of this column can expect a variety of news from Johannesburg, South Africa where the *Rand Model Aeronautic Club* has once more organized after the years of war-imposed inactivity. M. Rutherford, Secy., has introduced his club to our column and promises to send us complete details of all future modeling activities.

France

Held prior to the Irish competition described above, the International Model Aircraft Contest at Lyon in May was organized by Monsieur Guy Borge, press and organizing secretary of *Aero Club du Rhone et du Sud Est*, the aviation and model aviation club of Lyon. Mr. G. B. Dun, press secretary of *Northampton Model Aero Club*, England, and a member of the British team, sent us an account of the meet which was open to all countries. Models of the tailless or flying wing type were flown. Results:

1. Hans Rusterholz, Swiss. Time—214 sec.
2. Erich Voit, Swiss. Time—106 sec.
3. M. Dailly, French. Time—96 sec.
4. Hans Rusterholz, Swiss. Time—91 sec.
5. Hans Kern, Swiss. Time—52 sec.
6. G. B. Dun, British. Time—34 sec.
7. Howard Boys, British. Time—25 sec.

Gassie Helicopter

(*Continued from page 27*)

your body which may at some time come into that forbidden area of whirling wood.

It is advisable to paint the tips bright yellow or orange so they can more easily be noticed while they are turning.

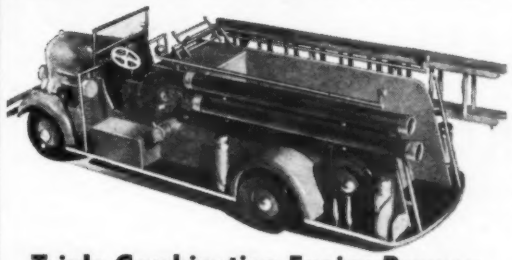
With a Class C engine a crankshaft rotor of 16" to 24" gives best results. A thin airfoil section and tapered plan form has proven highly successful. The blades should be carved in the conventional manner with blade angles washing out from 10° at the hub to 1° at the tip. A circular arc airfoil is easy to carve and very satisfactory.

For the large rotor we can obtain excellent (power on) performance with two, three or four blades. The more efficient two bladed type will have to be put aside on this job because we want to use a simple fixed pitch hub, and unless some method of reducing blade pitch is used when the power shuts off the two bladed fixed pitch main rotor is not satisfactory.

With three or four blades in the main rotor assembly we can use a simple fixed pitch hub and still obtain satisfactory power-off flight. In this case, when the engine cuts there is no abrupt halt in the air and then rapid acceleration as we might expect. The blades come to a stop and gradually begin to spin in the opposite direction. During this time the model is settling at increasing velocity until the rotors reach their top rpm. It slows up slightly and maintains this speed until it makes contact with the ground. When the blades revolve backward as they do in this case, their lift is not quite so great as if they were auto rotating in low pitch in the original direction; but their lift is sufficient to prevent major damage to the model. We select the fixed pitch semi-

(*Turn to page 79*)

MODEL KITS BY MACO



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Six-Wheel Tractor Drawn Trailer

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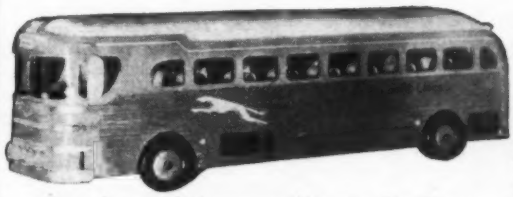

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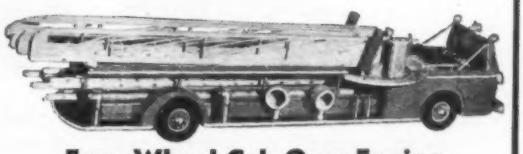

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rigid three bladed rotor on this model because it is not complicated, can take a lot of abuse and is easy to adjust. For this rotor we sacrifice the added efficiency of washed out blades for straight angled blades, because they are better under power-off conditions and easier to make. The diameter of our large rotor can vary from 25" to 45" and still give good performance. The larger size rotor will lift a greater load and of course make ground contact at lower speed. However, its top speed won't be reduced any noticeable amount as might be expected.

A large cone or dihedral angle does not give the stability we strive for. A slight angle does reduce the bending moment at the hub and help stability in flight (power off), but too great an angle will reduce the lift and cause oscillation in flight. The greatest stability factor is the gyroscopic effect, produced by the spinning large rotor and engine, which completely cancels out the force exerted by the small rotor. This stabilizing force is quite pronounced and can be easily felt when hand launching the model. This model has been flown with the blades bent down at a considerable angle and the stability was not seriously affected.

Soft pine is excellent material for these blades. Balsa blades must be made thicker in order to have enough rigidity, and their light weight and added drag can seriously affect the stability. They can be used by attaching light weights at the tips, however.

Airfoils without too great a center of pressure travel are best such as the N.A.C.A. 0009 for pine or N.A.C.A. 0020 for balsa. A circular arc airfoil with sharp leading and trailing edges will produce more lift and can be rotated either way with similar results. It is simple to make without elaborate templates and has proven very satisfactory.

FUSELAGE—A metal fuselage of .040" or .025" 24ST alclad will take a lot of abuse. Wooden and plastic fuselages have not been as satisfactory because they seem to be in constant need of repair from hard landings.

The lateral area of the fuselage should be kept small and its center kept high and slightly aft of rotor shaft centerline. If the area is large it will have greater tendency to spin due to the rapidly rotating slipstream of the small rotor. A small adjustable brake is used against the large rotor shaft to overcome this. By loosening or tightening the spring of this brake the fuselage can be made to turn either direction. The brake must be set tighter for hovering flight because the fuselage cannot weathercock under these conditions as it does in horizontal flight. A piano wire landing gear is excellent and wheels can be added, although they are not really necessary.

HUB—The large rotor hub which bolts to the engine should be metal. It can be formed of No. 27 piano wire (1/16") or built up of .051" 24ST alclad. Many different hubs have been used. One with a safety ring will save blades and fingers and reduce performance but slightly. Be sure the hub will not flex up into the small rotor under load or there'll be a sudden wooden shower after takeoff. The blades are attached to the rotor hub tabs with heavy thread or string making a dependable shock resistant mount. Rubberbands have allowed the blades to fly off at high rpm which makes an amusing sight to everyone but the model's owner.

CONTROL—Most man-carrying ships use the main rotor for control; by varying the center of lift through cyclic pitch the rotor disc can be flown at any angle de-

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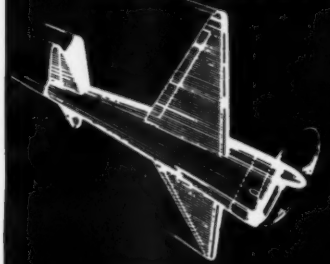

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sired, with the fuselage following along. On a simple hover-bug such as we are building the power unit can be flown without the fuselage as might be expected, but the flights will be close to vertical. It is not sufficient to attempt to tip the rotor hub for control unless the center of gravity or center of lift change at the same time. Should the hub be tipped in this manner the fuselage will change angle rather than the rotor disc, because the disc is a stable platform and the fuselage has little resistance to change.

We have a relatively high velocity slipstream on this model and this is used to advantage for control by placing control panels on aft end of the fuselage rather than going into the more complicated cyclic pitch system. These panels are mounted high on the fuselage so their center of drag will not cause the ship to nose down as they are extended. They can be bent in or out for adjustment and can be used for both rudder and elevator trim. A ballast box in the nose and one in the aft fuselage can be loaded with shot to give different flight adjustments.

ENGINE MOUNT—Different types of mounts will have to be made for different engines. Keep the mount as short as possible and be sure the shaft on which it spins is in alignment with the crankshaft center line. On the *Ohlsson 60* a three fingered metal plate was used having a .25" metal tube brazed to its center. The fingers bolt to the engine bearers and the tube is inserted in a metal pylon that acts as a bearing and allows the engine to spin freely. This pylon is bolted or riveted to the fuselage. I shortened the intake tube for clearance reasons and mounted the tank on a bracket using a plastic gas line from the tank to the needle valve. The engine is balanced by placing two penlight batteries and a lightweight coil opposite the engine barrel and by placing the condenser and gas tank opposite each other. Fit the tank as close as possible to the engine and balance the whole assembly with fine wire solder with the tank half full of gas.

The ship will fly satisfactorily even badly out of balance and will perform the hula should one large blade have more pitch than the others, but it will still fly.

FLYING—As no arrangement is made to control this model in flight, it is best to start with the ship pretty well balanced about the center of lift, the brake partly on and the control panels bent out just slightly. The power and weights can be adjusted as you go along using just enough power to fly it on the first flights. I do not suggest anchoring the ship by a cord or cords unless it is snubbed up close and only allowed to climb a few inches. If it gets any higher while it is tied it will reach the end of its rope in more ways than one. The wind will cause it to drift and the cord, of necessity being tied below the rotor, will force it into an ever steepening bank until ground contact is made with the blades rather than the landing gear.

Hand launching is easier than ROG because it is difficult to stay clear of the large blades so close to the ground. Launching racks or sticks which will permit the flight engineer to stay clear of the blades can be used to advantage for ROG.

It takes considerably more power to hover than it does to fly horizontally. From my observation, I liken the hovering ship to a fish trying to swim upstream because of the downward flow of air beginning far above the rotor blades. In

(*Turn to page* 83)

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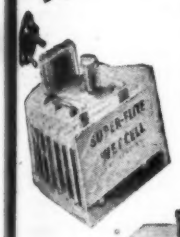

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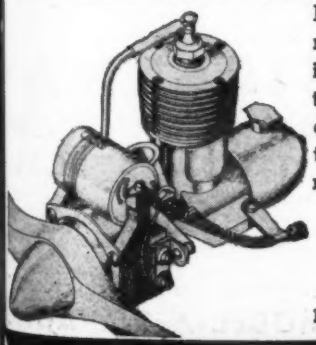

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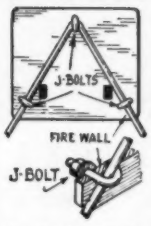

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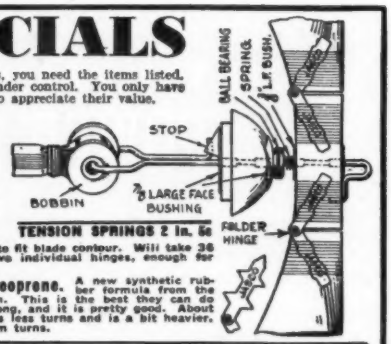

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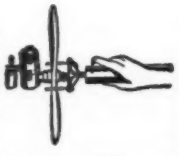

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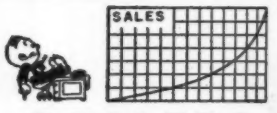

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horizontal flight, however, the helicopter is continually traveling through air that has relatively no vertical motion and consequently needs less power.

Ground effect is very noticeable if the load is heavy or the power output below par. This effect increases the lift of the blades when they are close to the ground. I've had several flights where the models would barely stagger off and fly out a full tank never gaining more than three feet of altitude. Apparently the rotor slipstream cannot move away freely from below the rotor because the air is restricted by the surface of the ground. This builds up the density of the high pressure area on the blades' lower surface and gives added thrust. When an altitude is reached where this effect is less pronounced the thrust diminishes.

If the model gets close to a wall it will tend to move into the wall because the slipstream creates a low pressure area at that point, so it's best to stay clear of such obstructions.

Design Forum

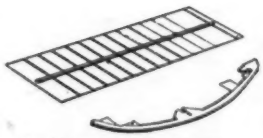
(*Continued from page 23*)

effect. Stability actually can be neutral, the important factor being control rather than stability. Like normal aircraft it must be possible to roll the ship or bank it sideways, to nose it up or down and to turn it right or left.

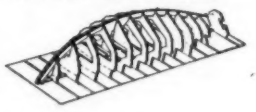
Note that Mr. Hartman has provided control surfaces at the trailing edges of the wings. The inner surfaces are ailerons, the outer trailing edge sections are elevators. To some it may appear that he has mistakenly reversed these. Such is not the case and Mr. Hartman has shown a keen insight in arranging them in this way. At very high speeds a slight movement of the ailerons will roll the ship sharply because they have tremendous effect. Ailerons not only have a rolling effect but the aileron that is pulled down has a drag effect greater than the one that turns upward. If they are placed at the wingtips possibly you can see what would happen. For instance, if you wish to bank the plane to the left the right aileron is pulled down and the left aileron is turned up for the purpose of lifting the right wing and lowering the left. This maneuver may take place but on the other hand the downward aileron creating greater drag will pull back on the right wing tending to turn the plane to the right while it is banked to the left. This in some cases will actually prevent a turn causing the plane to sideslip while flying straight.

When the ailerons are placed inboard, as shown in the drawing, they have great rolling effect but the drag of the lowered aileron is much closer to the centerline of the airplane and creates much less yaw.

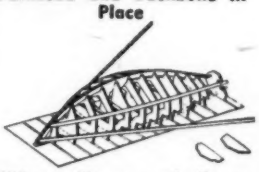
One of the greatest problems of flying wings or tailless aircraft is longitudinal stability. Usually the longitudinal control surfaces are only slightly rearward of the c.g. Consequently, their leverage is small. For complete and easy control the elevators should be placed as far back of c.g. as possible. Mr. Hartman has not only swept back the wings so that the elevators will be well to the rear of c.g. but he has placed them at the wingtips, which is that part of the wing which is farthest from the c.g. On the ordinary airplane the elevators are to the rear of the wing a distance equal approximately to half the span. In Mr. Hartman's plane this distance from c.g. to a line joining



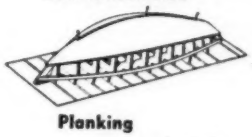
Jig Plan and Backbone



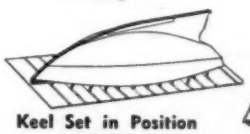
Bulkhead and Backbone in Place



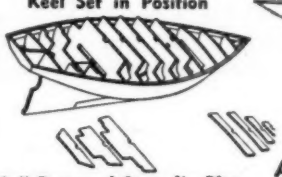
Chines, Sheers and Transoms Assembled



Planking



Keel Set in Position



Hull Removed from Jig Plan

Deck and Cockpit Floor Added

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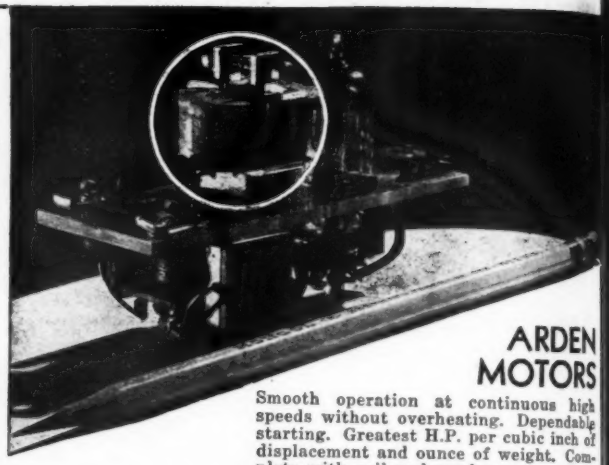

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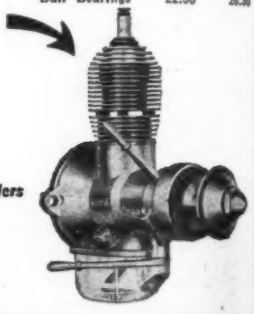

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the center of the elevators is about 85% of the span. This is excellent and much more than the average tailless airplane. It is much more important to place the elevators at this rearward position at the wingtips than to place them inboard where the ailerons are located.

Directional control is obtained by drag flaps or spoilers at the wingtips indicated on the drawing. As the ship turns it pivots about the c.g. so the leverage of these spoilers will be equal to the distance from c.g. to the middle of the spoilers. If rudders were used at the rear of the vertical fin, which has been common practice, the rudder lever arm would be much less and consequently would have less effect. The spoilers suggested by Mr. Hartman create this effect by being turned upward at an angle to the wing surface. This not only causes drag to one side of the c.g. but reduces the lift of the wing at this point. If the left spoilers is raised there is a dragging effect at the left wingtip as well as a loss of lift. Consequently, the plane will be pulled to the left and the left wing will drop producing a bank to the left. So we see that this arrangement causes a normal maneuver.

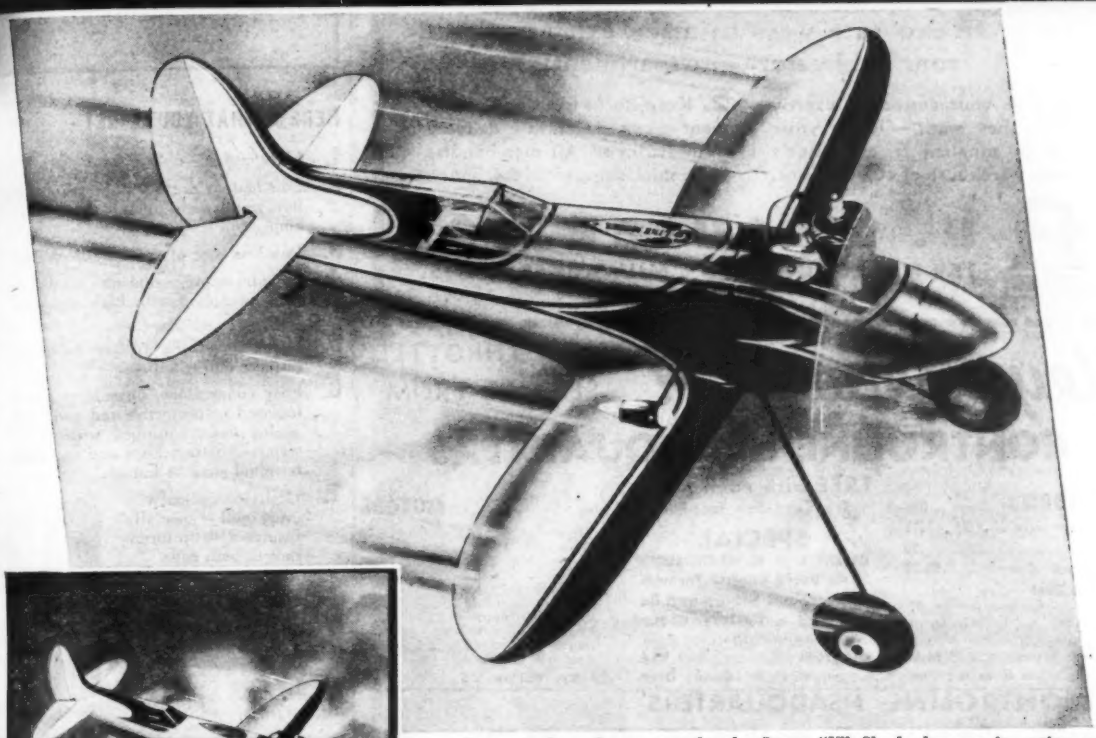
In all these respects Mr. Hartman's plane is excellent. He has made only one mistake. Because it has been the custom to place vertical fin surface above the longitudinal axis on low speed aircraft, he has located the fin surface on this plane in a similar manner. On sonic speed aircraft it simply will not work. For example, if the plane is banked and turned sharply to the right there will be a certain amount of side pressure on the airplane facing the outward side of the turn. This pressure will come on the fin. Being above the c.g., which tends to fly outward and continue in a straight path, a rolling couple is generated that will create excessive banking and spiral diving. Instead of placing the fin above the fuselage it should be placed below. A small fin may extend upward at the rear but the center of fin area should be on a horizontal line with the c.g., or below it if dihedral is used. Only slight dihedral is advisable in such airplanes but 2/3 of the fin area should be below the longitudinal axis of the airplane with 1/3 above it. *In fact, unlike airplanes we have known, all supersonic airplanes should have a vertical keel surface.* This is not commonly realized even by the most advanced engineers but this requirement has become indicated through tests by the author for this type of aircraft. This keel prevents skidding when turns are made at high speed and holds the plane in an even bank preventing the craft from heeling over sharply.

Mr. Hartman has specified retractable landing flaps which appear on the drawing. It is a question whether these would be effective. In themselves they would increase the lift but on the other hand they would destroy the airflow to their rear over a large section of the wing surface so though they might give extra lift when extended they would reduce the wing lift to their rear. As a rule this shape aircraft does not need landing flaps because with this wing plan form the maximum lift coefficient is nearly doubled. This results in a landing speed that is 25% slower than that of an airplane with ordinary straight wings and equal wing area.

Another excellent feature is the com-

(*Turn to page 87*)

RACY · RUGGED · and FULL of FLIGHT...
STANZEL *Super* "V" SHARK



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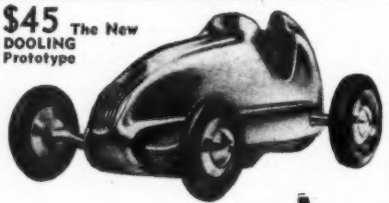

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paratively short chord which tends to reduce unstable movement of the center of pressure. To create a combination of short chord and long elevator moment arm in a tailless airplane is little short of genius, yet this is necessary for maximum stability and control in this type of craft.

* *

Jack E. Whitaker of Salisbury, N. C., also sends us a design of a sonic speed tailless airplane, Fig. 2. It is similar in most respects to Mr. Hartman's plane except that it is intended to be used as a fighter-bomber and is, therefore, much larger. Mr. Whitaker's airplane, like Mr. Hartman's, has the excellent feature of a long elevator moment arm. However, he uses the trailing edge of the wingtips as both elevator and ailerons. Both these surfaces may be moved upward, they may be moved in opposite directions or their motion may be a combination of these two. The chord on Mr. Whitaker's plane is larger than Mr. Hartman's and, therefore, unless the trailing edge of the wing has a reverse curve the center of pressure movement will be considerable. It is customary however to turn the trailing edge upward in such craft. This has the effect of a negative stabilizer and tends to create longitudinal stability.

Mr. Whitaker has made the same error as Mr. Hartman in placing the vertical fin above the wing surface with none below. Mr. Whitaker brings out the excellent feature possible in this type of craft, of placing gun turrets on each wing with an unobstructed line of fire.

We suggest that readers who are interested in this type of craft, work out their problems with models. Design and build a supersonic type of gas model. If the hints given here are followed your efforts should be rewarded by success.

* *

Robert Ronay, Sgt. 2d Class, 3d Division, U. S. Ship Juneau (CL119) c/o F.P.O., New York, N. Y., submits the design for a jet motor model, Fig. 3. He calls to our attention the location of the motor well below the gas tank. This type of jet engine requires fuel pressure for its operation. Usually a spring plunger creates pressure on the fuel forcing it into the engine. However. Sgt. Ronay suggests the arrangement shown with the tank a considerable distance above the engine so that gravity provides the required pressure. This is an excellent idea in itself but has run Sgt. Ronay into a lot of trouble without his realizing it.

In his model the line of thrust runs through the center of the engine. The line of resistance is far above it, approximately at the leading edge of the wing at its center. The drag of the wing alone when it has dihedral is above the wing center. The fuselage extending below the wing will approximately compensate for the wing drag above the center point of the wing leading edge. Consequently we have a sharp nosing up couple as indicated in Fig. 3A. This results in the plane climbing sharply when under power and diving steeply in a glide. In other words, there is a great difference in pitching moment with power on and power off. Best results are obtained when the reverse of Sgt. Ronay's arrangement is employed. In other words, when the thrust line is above the line of resistance it creates a nosing down couple under power, thereby allowing a wing adjustment with the c.g. well to the rear. The best place is approximately 50% of the wing chord from the leading edge.

With this setup when the power dies the airplane noses into a gentle flat glide that reduces sinking speed to a minimum.

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Sgt. Ronay shows the method of attachment of his motor and unique features of construction. The fuselage is laminated with the lamination staggered to form an oval section when they are carved down and smoothed off. We believe Sgt. Ronay will have more satisfactory flights with his engine located above the center of the wing or immediately below it regardless of the fact that a spring plunger may have to be used on his gas tank.

Send your ideas and designs for discussion. Special attention will be given to models in future issues. If in doubt about the type of performance your model will render or features of its construction, design, etc., send in drawings or carefully made sketches for discussion here. Neatest entries will be given preference.

Electric Starter

(*Continued from page* 36)

before securing Item 32 in place.

The coupling is made up of three sizes of radiator hose that fit snugly into one another and are held together with a hose clamp or similar means. I am not giving sizes of the hose because you may not be able to obtain the same sizes. All you have to do is follow the above procedure and make certain the inside diameter of the smallest hose fits snugly over the starter motor shaft. Booster terminals may be plug-in jacks or any of the knurled bakelite knob type posts.

In the material list, a Tetco fire extinguisher is specified. This item is optional and is only included as a safety factor in case a model catches fire.

The three pieces of 3/8" pipe are screwed together to form a U shape. The legs of the U are drilled to receive two 1/4" bolts and nuts in each leg whereby they are fastened securely to the back of the starter box.

The purpose of the axle bracket is to facilitate rolling the box from place to place when the wheels are in the lower position and to have it rest flat on the baseboard when the wheels are in the upper position. Movement of the shaft can be made by foot. Hinges and latches may be put on approximately as shown on plans. When assembling the cables and wiring make sure all connections are securely fastened. One charge of the battery will last one month of heavy usage.

The detailed parts list shows all items needed to construct the large starter and tool case, which is detailed on the right hand side of the plans.

Sometimes a more compact starter is required and the left hand plans show one that was built to fill this need. It is small enough to set on the floor of any car and is just big enough to hold battery, starting motor, and a small tool tray. This starter has a slightly different hookup from the big one. A regulation auto starting relay is used and is mounted next to the motor to allow short battery leads. A flexible cable operates the relay by a switch connected on the end. The hookup shown for the large starter may be used just as well for the small one, however, if the remote control is not required.

That should about cover everything now, but if there are any questions the plans are drawn to scale and there should be no difficulty in scaling anything questionable from them.

Lots of luck in building, and hope you will have more time for flying when you finish your starter.

PARTS LIST

1. Ford starter motor
2. Ford starter switch

3. 5 hinges
4. Starter motor bolts
5. Radiator hose—3 concentric sizes
6. 1 Hose clamp to fit largest dia. rad. hose
7. 3/8" I. D. pipe 2 pieces 15"
8. 12" (both ends thread.)
9. 2 pipe elbows to fit 3/8" pipe
10. Battery cable 3 lengths 40"
11. Battery cable 3 lengths 9"
12. Battery cable 3 lengths 18"
13. Car battery (any 13 plate)
14. 6" wheels 3/8" hole
15. 3/8" axle
16. 2 steel plates 2 x 3-1/2 x 1/4
17. 2 terminal posts (booster terminals)
18. 2 latch sets
19. Washer and cotter pin
20. 1 alligator clip for booster wire
21. No. 16 insulated wire—2 lengths 15"
22. No. 16 insulated wire—2 lengths 20"

1/2" STOCK

23. 9" x 32" sides—2 pieces
24. 6" x 15" front cover
25. 3" x 15" front cover hinge board
26. 7" x 16" top cover
27. 2" x 16" top cover hinge board
28. 7-1/2" x 15" top shelf
29. 7-1/2" x 15" middle shelf
30. 7-3/4" x 15" lower shelf
31. 3" x 7-1/2" end partition blocks—4 pieces
32. 7-1/2" x 4-3/4" motor shelf partition

3/4" STOCK

33. 15" x 32" back
34. 12" x 15" front (motor board)
35. 12" x 15" baseboard

1/4" STOCK

36. 3" x 7-1/2" starter button pedal
37. 3" x 15" top shelf partition
38. 2-3/4" x 3-3/4" partitions (tool box)
39. 4" x 15" bottom (tool box)
40. 1-3/4" x 15" sides—2 pieces (tool box)

Flash News

(*Continued from page 2*)

proving ground is being developed near Point Magu, Cal.

THE LARGEST airplane to fly in aviation history was airborne on August 8, 1946, at Fort Worth, Tex. The monster 160 ton Consolidated Vultee XB-36 "exceeded expectations" on this first flight. The strategic bomber is powered by six Pratt & Whitney R-4360 engines driving pusher propellers. Together with the Northrop XB-35 *Flying Wing*, the XB-36 has been designed to carry a load of 10,000 lbs. of bombs for a distance of 10,000 miles. The 230 ft. span craft is scheduled for quantity production and will form the nucleus of the nation's very-long-range strategic bombardment force. A sister ship, the XC-99 cargo version, is now nearing completion.

ON A TRIAL run over the new speed course between Bognor and Worthing, England, a Gloster *Meteor* IV attained a speed of 626 mph. The plane used is powered by a "souped up" *Derwent* V turbojet unit and features a special metal canopy replacing the plastic ones used previously. The intense heat generated by high speed flight (60° F. in a Lockheed P-80 *Shooting Star* flying at 550 mph!) caused warping and cracking of the plastic canopies used in the record flights previously. Incidentally, engineers are convinced that the P-80 will *not* break the world speed record because of its wing design. The XP-84, however, has an airfoil designed for much higher speed!

THE GIANT Douglas C-74 *Globemaster*, largest cargoplane in production, was destroyed in a crash while undergoing dive tests. The four engine transport, one of 4 that had been delivered to AAF, was undergoing stress tests with varying load conditions when, according to the pilot, the left wing broke off. Russell Thaw, Douglas test pilot and well known aviation sportsman, and his crew parachuted to safety. The C-74 recently established a record for load-lifting when the same airplane made a successful flight at a gross weight of 172,000 lbs. (Gross weight of the XB-36 on its first test flight was not revealed.)

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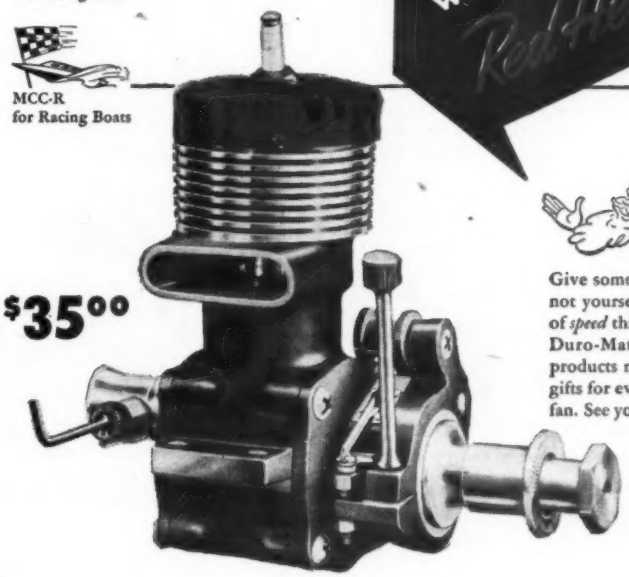

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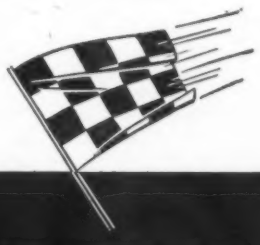

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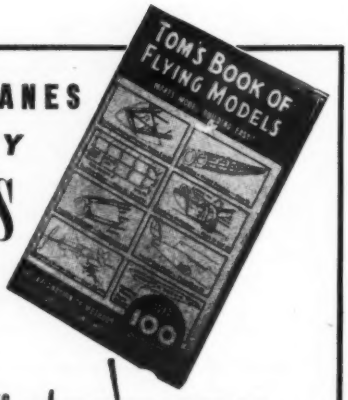

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CAMERON BROS., CHINO, CALIF.

A NEW east-to-west transcontinental flight record of 7 hours 28 minutes has been established by a Boeing B-29 *Superfortress* in a recent flight from New York to Burbank, Cal.

CONTINUED development of JATO equipment and techniques reveals progress in this new field. A Douglas C-54 *Skymaster*, whose takeoff run is normally 3,000 ft., was recently gotten off the Memphis Army Air Base in 700 ft. through use of four jet-assisted takeoff rocket units. This is a reduction of 77% in takeoff run for a heavy transport!

THE COMPLETE line of Republic *Bee* personal aircraft is now available, although only the famed *Seabee* 4-place amphibian is now in production. Plans are now well advanced in the *Twinbee*, a slightly enlarged version of the *Seabee*. This new design will carry five or six passengers and will be powered by two Franklin 215 hp engines, although both engines will be geared to a common propeller. Plans are to use many *Seabee* assemblies on the new model, including the complete wing and empennage and many cabin sub-assemblies. Following the *Twinbee* will come the *Landbee*, a landplane version of the *Seabee*, which will be identical to it in all respects with the exception of replacing the seaplane hull with a conventional landplane fuselage. Next on the list is the *Beebee*, a small 2-place, 100 hp landplane version utilizing the major assemblies of the *Seabee*. The bees are sure buzzin' at Republic!

MORE ACCURATE determination of "winds-aloft" speed and direction is now available through a newly developed AAF system of radar tracking. Meteorological balloons to which metallic reflectors are attached are released and climb to altitudes of more than 100,000 ft. before bursting due to the decreased pressure. Radar equipment tracks the direction, rate-of-ascent, velocity and altitude of these balloons, providing more accurate information in all types of weather than the previously limited theodolites.

THE IDEA of the "seadrome," considerably shopworn today after nearly 15 years of castigation, is still very much alive at least in the minds of the Army. Tests on a 280 ft. model, scaled down from a projected 6000 ft. long design, were recently completed for the Army by the Sun Shipbuilding Co. at Chester, Pa. Although no plans for actual construction of a "seadrome" have been announced by the Army, they are seriously interested.

FIRST TAKEOFF of an all-jet aircraft of American design from a carrier at sea was completed successfully recently on the carrier U.S.S. *Franklin D. Roosevelt* 35 miles at sea off the Virginia Capes. The tests were not a "stunt" but actually only a routine specification test of the McDonnell XFD-1 *Phantom*. Navy fighter plane contracts specify that the prototype must perform five landings and takeoffs from a carrier at sea prior to acceptance and the *Phantom* completed these without incident. The tiny fighter, powered by two Westinghouse 19-B jet units, got off the largest seaborne landing field in the world after runs of less than 400 ft. with the *F.D.R.* steaming at 20 knots into a 15-20 knot wind. On the fourth approach pilot Lt. Comdr. James Davidson USN was "waved off" and climbed up and away smartly and safely, thus providing the final answer to the objection that a jet plane could not take a "wave-off" safely. Your "Flash News" reporter was aboard and witnessed these tests, which establish another landmark in naval aviation history.

FIRST PHOTOS of the McDonnell XHJD-1 helicopter reveal it as a twin engine design with laterally supported dual rotors, resembling the Platt-Lepage XR-1 in general layout. The craft weighs 11,000 lbs. fully loaded and carries a 2500 lb. payload, made up of either 7 passengers and pilot or cargo.

DETAILS ON the Bell XS-1 transonic test plane are available although it still remains on the secret list. Three of the tiny planes are to be built, the first to be assigned the National Advisory Committee for Aeronautics for fundamental investigations in its wind tunnels and in flight tests. First test flight of the rocket-powered plane will be made by Jack Woolums, youthful Bell Aircraft Co. test pilot. The craft is expected to be the first piloted device to reach a speed of 1000 mph. This speed will be attained at an altitude of 60-70,000 ft. Although straight wings will be used on the first model, subsequent designs will utilize sweepback which permits travel in the supersonic region. The XS-1 is equipped with a pressure cabin. Similar designs are now under development by Douglas Aircraft Co. for the Navy Department.

THE BEECHCRAFT *Bonanza*, long awaited four-place private plane, has been revealed as a conventional cabin low wing monoplane with an unconventional "butterfly" empennage. This tail consists of two large surfaces attached at a large dihedral angle, tested earlier on the Beech AT-10 monoplane. The design is said to eliminate the need for rudder control except for use in making crosswind landings or takeoffs. The speedy craft is powered by a Continental 165 hp engine which gives it a top speed of 184 mph at sea level, making the *Bonanza* one of the fastest lightplanes yet announced. It cruises at 175 mph at 10,000 feet and has a range of 750 miles. Of all-metal design and featuring a luxurious cabin, the craft is priced at $7345. Although this price largely eliminates the private owner, Beech aimed the design at commercial operators and have prepared elaborate figures stressing the economy of the design, due largely to its high speed.

FINAL FIGURES reveal that more than 30,000 airmen saved their lives by parachuting to earth (or sea) during the war, according to Leslie L. Irvin, Pres. of Irvin Air Chute Co. and founder and sponsor of the famed *Caterpillar Club*. Purpose of this study of course was to reveal that 99% of these airmen saved their lives with Irvin parachutes which, while publicity, nevertheless constitutes one of the most significant lifesaving efforts in our time. Assuredly Irvin deserves this recognition.

Nationals

(Continued from page 22)

testant. Obviously many were trying to make up for 5 years of no national meets by flying in every event humanly possible.

Among the highlights of the meet were demonstrations of jet powered control line speed craft by representatives of the Minijet concern which attracted large numbers of spectators to the Boeing parking ramp. Jim Walker exhibited several different radio control models and systems, including a new mid-wing job which looks like a big brother of the popular *Fireball* plane.

Ray Arden, designer of the *Arden* .099 and .199 engines, was a center of attraction with his 1908 model gas engine which

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Cannon "358"	21.50
Hurricane	19.75
OK 60	21.00
Rocket	22.50

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Kencraft Control Handle (Cast Aluminum—Pistol Grip)	$1.00
Aero Quality Coil	3.00
Aero Featherweight	2.50
Smith Firecracker	2.75
Metal Condenser	.25
Austin Timer	1.50
Toggle Switch	.45
Slide Switch	.25
Champion Plugs (All Sizes)	.50
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Expert Design—Accurate Pitch

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10" & 11"	45c	10" & 11"	60c
12", 13" & 14"	50c	12"	65c
16"	70c	Those may be had in 8, 9, 10, 11, and 12 inch pitch.	
18"	90c		

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A-C NEEDLE VALVE
Gives broader, more accurate tuning and steps up motor performance. Complete, ready to install, with synthetic tubing for attaching to tank.....75c

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Fine flexible wire with new type covering for better insulation. Oil and gas proof.....15c

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These high-polished hub caps cost only 25c for 2, and come drilled for 3/32" and ⅛" axles .....Pair 25c

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If you want a real hot spark, get a Hotcha! More pep with less battery drain. Real Bakelite case. Handy mounting lugs. White hot spark with 3 volt batteries. Complete with lead $2.50

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¼ oz. Penlite, ⅜ oz. medium, ½ oz. large 40c

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Good looking. Protects model 35c

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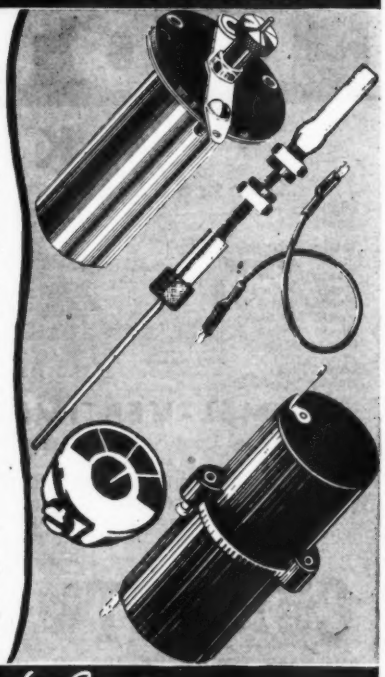
Old West miniature. ½" to ft. scale..$1.00



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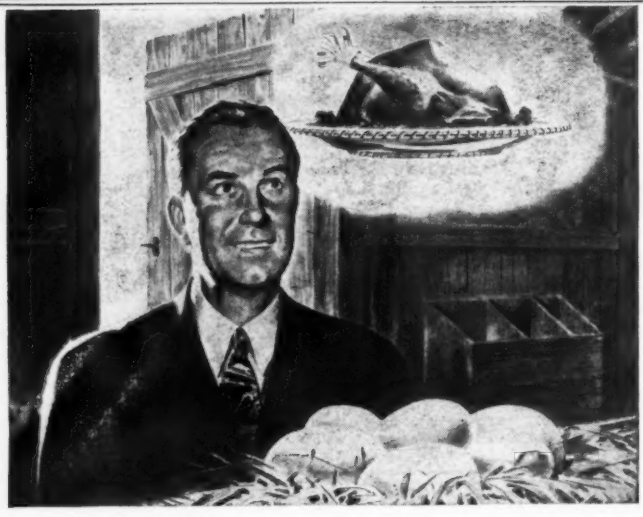

Sometimes you can break a good rule!

It's usually a wise rule not to plan a chicken dinner before the eggs are hatched.

But not always!

If the "chicken dinner" represents your future, and the "eggs" are financial nest eggs—go ahead and plan!

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featured the original propeller, a windmill like affair exactly like the larger propellers of the early days of full scale flying. In addition Mr. Arden had his smallest gas motor, slightly smaller than the tip of your small finger, as well as a "bigger" engine which was all of 1½ inches high. The "large" motor, with its own special prop, has a number of hours running time; the wee one has more than 2 hours total running time to date.

A new wrinkle for national meet contestants was the Micro-Bilt bus, a fully equipped workshop on wheels where free field repairs could be made on all types of motors by experienced engine mechanics. In addition, a.c. outlets were available so contestants could hook in electrically heated soldering irons and make emergency repairs.

In the best-finish event, V. W. "Tex" Russell, Ft. Worth, Texas, took first with his original design *Vampire* control line model; Jack Armstrong, Wichita, was second with a Rearwin *Speedster;* and third place went to Rogers Barton, College Station, Texas, whose *Buzzard Bombshell* had suffered major damage at the hands of a Wichita garage attendant after successfully completing a 5,000 mile tour of the U. S. Needless to say, Mr. Barton was up pretty late for several nights repairing and refinishing his entry.

Other highlights of the contest were a number of messages received from aviation leaders. These included greetings and congratulations from Gen. Carl Spaatz, commanding general of the Army Air Force, John K. Northrop, Glen L. Martin, Eddie Rickenbacker, Donald W. Douglas, James M. Landis, W. P. Piper, L. Welch Pogue, Lowell H. Swenson, Dr. George W. Lewis, and others. President Harry S. Truman sent this message:

"I wish it were possible for me to be with you for the award of prizes so that I might express to you personally my belief in the importance to the youth of America of meetings such as this.

"The war has focused attention on airplane design and the romance of aviation, but I want to emphasize the importance of the airplane and air transportation as an instrument of peace and a means of promoting international understanding and accord.

"It is my sincere hope that the Academy of Model Aeronautics will continue its work to stimulate your imaginations and foster your ability and that through the efforts expended and the ideas brought forth America's air transportation, both military and civil, will continue in the future to lead the world in progress and development."

During the contest the A.M.A. nominating committee met to select a slate of officers for presentation to members in the first election held since 1942. Heading up the list is Everett N. Angus of Oaklyn, N.J., for the position of president. An election by mail ballot will have taken place by the time this reaches print.

Top place winners in the various events were as follows:

Outdoor Rubber Stick—Open
1. Mark Heller, Chicago—26:50.3
2. Geo. Reich, Cleveland, Ohio—25:55.8
3. J. A. Pierce, St. Joseph, Mo.—23:49.2

Outdoor Rubber Cabin—Sr.
1. R. L. Denton, Kenosha, Wisc.—6:28.8
2. D. D. Miner, Wichita, Ks.—5:02.8
3. Frank Garcher, Chicago, Ill.—4:36.1

Outdoor Rubber Cabin—Jr.
1. J. K. Clemens, Naperville, Ill.—3:00.2
2. Robert Wykes, Medford, Mass.—2:54.4
3. Thad Taft, Los Angeles, Cal.—1:33.0

Outdoor Rubber Cabin—Open
1. Geo. Wright, Cleveland, O.—7:26.5
2. H. A. Cole, Seattle, Wash.—7:04.4
3. Robert Annas, Detroit, Mich.—6:44.5

Flying Scale—Outdoor
1. Henry Struck, Old Lyme, Conn.—77.6 pts.
2. C. D. Lanzo, Cleveland, O.—63 pts.
3. R. G. Schmitt, Chicago, Ill.—60 pts.

Auto-Heli-Orni Outdoor—Sr. (No Jr.)
1. Geo. Haroutunian, Chelsea, Mass.—1:56.3
2. Wm. Ehrich, Chicago, Ill.—0:02.1
3. W. D. Schoenky, Kirkwood, Mo.—0:02.0

(*Turn to page* 94)

The Inside Story of ARDEN .099

SUPERIOR PERFORMANCE

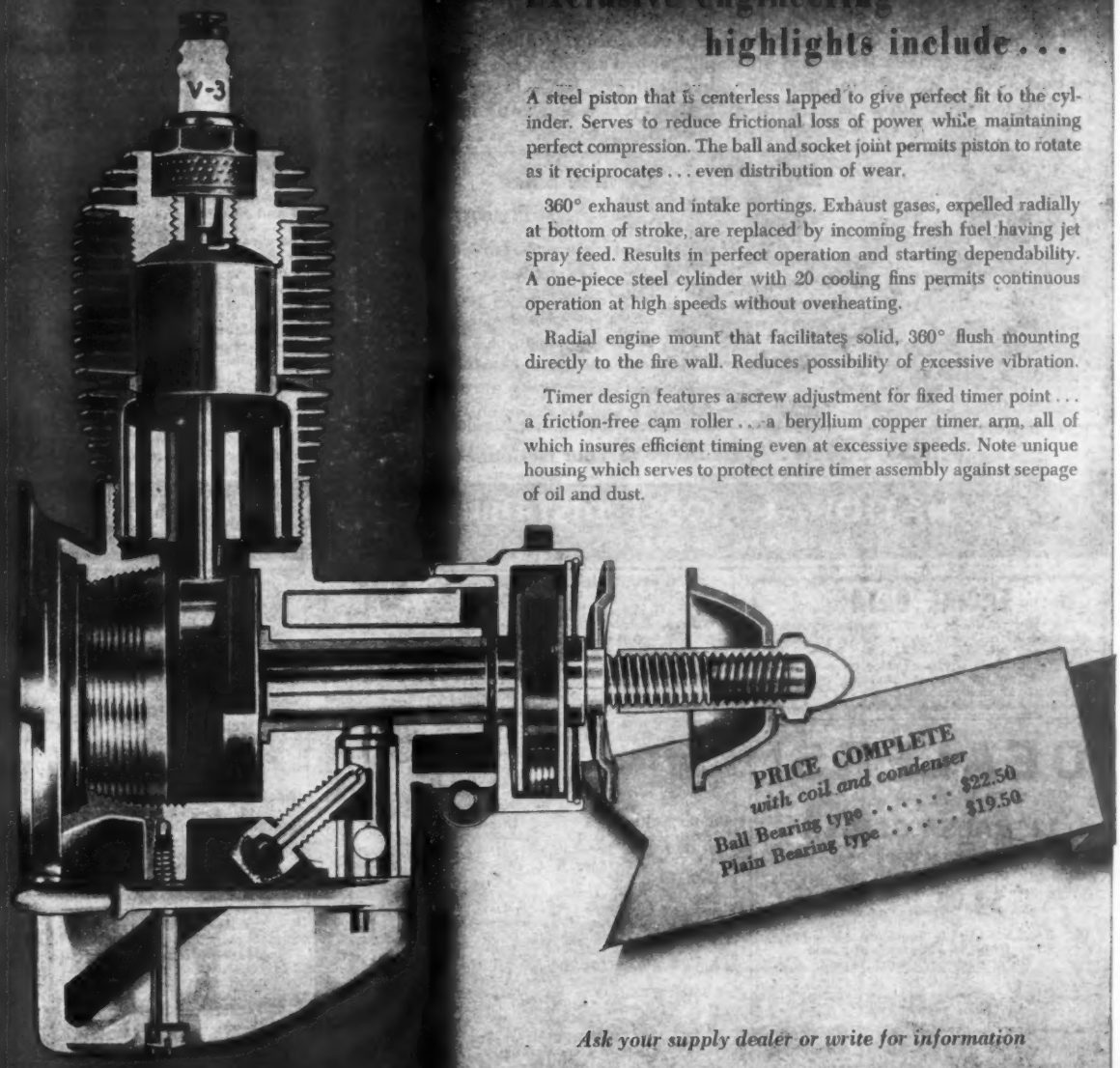
Exclusive engineering highlights include . . .

A steel piston that is centerless lapped to give perfect fit to the cylinder. Serves to reduce frictional loss of power while maintaining perfect compression. The ball and socket joint permits piston to rotate as it reciprocates . . . even distribution of wear.

360° exhaust and intake portings. Exhaust gases, expelled radially at bottom of stroke, are replaced by incoming fresh fuel having jet spray feed. Results in perfect operation and starting dependability. A one-piece steel cylinder with 20 cooling fins permits continuous operation at high speeds without overheating.

Radial engine mount that facilitates solid, 360° flush mounting directly to the fire wall. Reduces possibility of excessive vibration.

Timer design features a screw adjustment for fixed timer point . . . a friction-free cam roller . . . a beryllium copper timer arm, all of which insures efficient timing even at excessive speeds. Note unique housing which serves to protect entire timer assembly against seepage of oil and dust.



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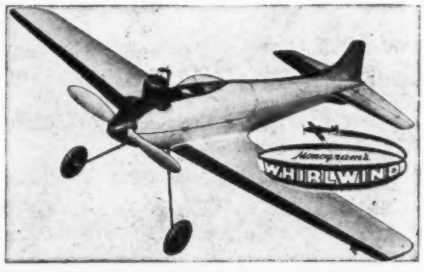

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Be the first with the new "Whirlwind." Completely shaped and hollowed body, finished wing panels, plastic spinner and canopy. Get-at-able power plant with hinged cowling. Your customers will want this and National has it. List $7.95.

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Check these highlights-

1. The only Booster Jack that provides instantaneous polarized connection and disconnection of booster batteries. Polarized connection prevents any damage to pen cells due to incorrect hook-up.
2. The polarized connection is designed to prevent short circuiting of booster batteries when not in use. Made of red plastic, it can be readily detected on ground or grass.
3. The Booster Jack is provided with six feet of heavy gauge flexible wire which is adequately insulated and resistant to oil and gasoline.
4. The wire at one end of the Booster Jack is equipped with battery connectors having the positive and negative leads identified by red and black sleeves.
5. EXTRA TERMINAL CONNECTORS are available for the modeler having a number of planes. The polarized Booster Jack can be used on any plane equipped with the fuselage connector.

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Fly indoor or outdoor all year 'round

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Auto-Heli-Orni Outdoor—Open
1. H. P. Schoenky, Kirkwood, Mo.—3:03.1
2. Carl Goldberg, Chicago, Ill.—2:04.6
3. D. J. Lidgard, Chicago, Ill.—0:52.0

Outdoor Towline Glider—Jr.
1. R. D. Johnson, Wichita, Ks.—1:15.5
2. J. S. McClelland, Independence, Ks.—0:22.4
3. Hobert Braden, Independence, Ks.—0:19.28

Outdoor Towline Glider—Sr.
1. J. H. Brown, Wichita, Ks.—0:56.9
2. Carl Unruh, Wichita, Ks.—0:48.7
3. R. E. Wallace, Wichita, Ks.—0:30.4

Outdoor Towline Glider—Open
1. Dick Korda, Cleveland, O.—2:15.5
2. M. D. Andrade, Oakland, Cal.—1:45.5
3. G. P. Perryman, La Grange, Ga.—0:56.0

Outdoor H. L. Glider—Jr.
1. B. R. Brewer, Rockford, Ill.—0:59.1
2. Geo. Patrick, Houston, Tex.—0:32.8
3. Thad Taft, Los Angeles, Cal.—0:30.0

Outdoor H. L. Glider, Sr.
1. O. Irish, Tulsa, Okla.—2:42.0
2. D. A. North, Venice, Cal.—1:51.5
3. R. S. Anderson, Tulsa, Okla.—1:13.7

Outdoor H. L. Glider—Open
1. A. G. Peterson, Oakland, Cal.—3:44.8
2. C. J. Mather, Naperville, Cal.—1:20.3
3. H. G. Demos, Oakland, Cal.—1:14.0

Junior Class A Gas
1. W. D. Leaf, Okla. City, Okla.—5:05.9
2. J. W. Cordell, Bartlesville, Okla.—3:39.1
3. D. N. Wade, Los Angeles, Cal.—3:16.0

Senior Class A Gas
1. Herbert Kothe, Omaha, Nebr.—7:44.2
2. Al Milana, Omaha, Nebr.—7:36.0
3. W. K. Mather, Cleveland, O.—6:48.5

Indoor H. L. Rubber Stick—Jr.
1. Robert C. Wykes, Medford, Mass.—11:39.0
2. Raymond Wykes, Medford, Mass.—11:39.0
3. B. J. Schwennesen, Chicago, Ill.—5:12.0

Indoor H. L. Rubber Stick—Sr.
1. Geo. Haroutunian, Chelsea, Mass.—11:24.7
2. John Frankovich, Revere, Mass.—9:34.9
3. R. J. Fox, Detroit, Mich.—8:30.1

Indoor H. L. Rubber Stick—Open
1. C. D. Janke, Sheboygan, Wisc.—15:31.6
2. W. E. Atwood, Pasadena, Cal.—14:36.4
3. M. S. Andrews, Forest Hills, N.Y.—14:13.2

Indoor Rubber Cabin—Jr.
1. Robert Wykes, Medford, Mass.—6:29.8
2. Raymond Wykes, Medford, Mass.—1:22.6

Indoor Rubber Cabin—Sr.
1. D. E. Weiler, Chicago, Ill.—5:27.8
2. George Haroutunian, Chelsea, Mass.—0:31.0

Indoor Rubber Cabin—Open
1. M. L. Huguelet, Chicago, Ill.—14:12.0
2. M. S. Andrews, Forest Hills, N.Y.—12:28.4
3. F. W. Stanwick, Lakehurst, N.J.—12:26.6

R. O. W. Indoor
1. Merrick Andrews, New York, N.Y.—6:00.0

H. L. Glider—Indoor—Jr.
1. Robert Wykes, Medford, Mass.—0:30.3
2. R. E. Piper, Chicago, Ill.—0:26.5
3. Raymond Wykes, Medford, Mass.—0:25.6

Indoor H. L. Glider—Sr.
1. William Morez, Chicago, Ill.—0:34.0
2. C. J. Banks, Kenosha, Wisc.—0:31.2
3. Geo. Haroutunian, Chelsea, Mass.—0:30.8

Auto-Heli-Orni Indoor—Jr.
1. Robert Wykes, Medford, Mass.—2:04.0

Indoor Heli-Auto-Orni—Sr.
1. C. M. Goldstein, Chicago, Ill.—2:32.2
2. Geo. Haroutunian, Chicago, Ill.—1:32.0
3. R. E. Wallace, Wichita, Ks.—0:57.2

Indoor Auto-Heli-Orni—Open
1. Carl Goldberg, Chicago, Ill.—4:06.2
2. Carl Goldberg, Chicago, Ill.—3:18.2
3. H. P. Schoenky, Kirkwood, Mo.—2:56.1

Radio Control
1. Jim Walker, Portland, Ore.—51.84 pts.
2. W. G. Siegfried, Wichita, Ks.—43.17 pts.
3. Paul Helphinstine, Coffeyville, Ks.—0 pts.

Best Finish
1. V. W. Russell, Fort Worth, Tex.—(Vampire)
2. Jack Armstrong, Wichita, Ks.—(Rearwin)
3. Rogers Barton, College Station, Tex.

Outdoor Rubber Stick—Jr.
1. Thad Taft, Los Angeles, Cal.—19:25.0

2. R. P. Wykes, Medford, Mass.—17:38.6
3. Robert Wykes, Medford, Mass.—13:11.3

Outdoor Rubber Stick—Sr.

1. G. T. Flesher, Rockford, Ill.—12:56.03
2. Herbert Kothe, Omaha, Nebr.—12:27.07
3. A. H. Fritz, Chicago, Ill.—12:01.6

Open Class A Gas

1. Bill Burks, Birmingham, Ala.—10:21.5
2. C. O. Wright, Topeka, Ks.—8:26.7
3. K. E. Burr, Portland, Ore.—7:58.0

Junior Class B Gas

1. D. N. Wade, Los Angeles, Cal.—20:25.4
2. R. Weber, Houston, Tex.—3:45.1
3. B. L. Kampton, St. Joseph, Mo.—3:23.7

Senior Class B Gas

1. M. K. Mather, Cleveland, O.—23:19.0
2. R. R. D'Onofrio, Watertown, Mass.—18:48.2
3. Andre Stavast, Highland, N.J.—15:10.6

Open Class B Gas

1. Herman Weber, 28:57.7
2. James Niles, Ames, Ia.—27:39.4
3. Robert Sweger, St. Paul, Minn.—23:18.0

Junior Class B Gas

1. D. N. Wade, Los Angeles, Cal.—14:35.0
2. P. Ono, Denver, Colo.—4:39.5
3. R. Tooley, St. Louis, Mo.—4:32.1

Senior Class C Gas

1. D. L. Benson, Washington, D.C.—12:44.6
2. C. B. Blumen, Minneapolis, Minn.—9:49.1
3. A. S. Bihler, Omaha, Nebr.—8:30.3

Open Class C Gas

1. F. A. Davis, San Diego, Cal.—37:57.9
2. G. M. McClure, Okla. City, Okla.—37:39.2
3. Don Justice, Fontana, Cal.—18:23.9

K. O. W. Gas

1. Ted Gillette, Hollywood, Cal.—392.7 sec.
2. Lew Mahieu, Long Beach, Cal.—237.6 sec.
3. William E. Lopez, Los Angeles, Cal.—168.4 sec.

Control Line—Class I & II—Jr.

1. E. J. Schwartz, Little Rock, Ark.—45.23 mph
2. Dave Webb, Dallas, Tex.—36.00 mph

Control Line, Class I & II—Sr.

1. Jack Norris, Lakewood, O.—77.58 mph
2. W. K. Mather, Cleveland, O.—57.69 mph

Control Line, Class I & II—Open

1. Dick Korda, Cleveland, O.—69.23 mph
2. Donald McClusky, Irondale, Ala.—62.93 mph
3. R. W. Robertson, Birmingham, Ala.—62.93 mph

Control Line, Class III—Jr.

1. Leon Shelton, Salina, Ks.—83.72 mph
2. Paul White, Akron, O.—83.13 mph
3. Skippy Pickney, Elmhurst, Ill.—54.21 mph

Control Line, Class III—Sr.

1. Thomas Burns, Cleveland, O.—88.67 mph
2. J. Ridella, Cleveland, O.—77.58 mph
3. J. Glunta, Cleveland, O.—73.77 mph

Control Line, Class III—Open

1. Geo. Sugichi, Cleveland, O.—84.90 mph
2. R. W. Shuelke, Wichita, Ks.—78.94 mph
3. Les McBrayer, Alhambra, Cal.—77.92

Control Line, Class IV & V—Sr.

1. G. R. Pate, Fort Worth, Tex.—75.31 mph
2. Kenneth Flagler, Des Plaines, Ill.—58.44 mph

Control Line, Class IV & V—Jr.

1. Dave R. Webb, Dallas, Tex.—71.14 mph

Control Line, Class IV & V—Open

1. D. W. Newberger, Long Beach, Cal.—98.90 mph
2. C. W. Mumaw, Kansas City, Mo.—97.29 mph
3. J. R. Fowler, Kansas City, Mo.—92.30 mph

Control Line VI—Jr.

1. David A. Hicks, Webster Groves, Mo.—96.77 mph
2. Glen Vandiver, Shreveport, La.—92.30 mph
3. Paul White, Akron, O.—91.83 mph

Control Line VI—Sr.

1. C. B. Blumer, Minneapolis, Minn.—103.15 mph
2. A. L. Strickland, Birmingham, Ala.—100.55 mph
3. J. W. Gorham, Akron, O.—100.00 mph

Control Line VI—Open

1. C. H. Wallick, Long Beach, Cal.—116.12 mph
2. M. A. Tennison, Dallas, Tex.—107.14
3. Stanley Sieminski, Cleveland, O.—105.88 mph

Control Line Stunt—Jr.

1. Davis Slagle, Burbank, Cal.—102 pts.
2. Dave R. Webb, Dallas, Tex.—86 pts.
3. Glen Vandiver, Shreveport, La.—73 pts.

Control Line Stunt—Sr.

1. M. A. Cummins, Los Angeles, Cal.—40 pts.
2. W. E. Pascoe, Gr. Bend, Ks.—22 pts.
3. R. K. Arnett, Hoisington, Ks.—20 pts.

Control Line Stunt—Open

1. R. H. Roof, Tulsa, Okla.—56 pts.
2. John Casburne, Fort Worth, Tex.—44 pts.
3. W. E. Semler, Denver, Colo.—33 pts.

Control Line Stunt—High Point Winner

Davis Slagle, Burbank, Cal.—102 pts.

All Gas Events—High Point Winner

Frank Davis, San Diego, Cal.

Highest Individual Flight Time

Frank Davis, San Diego, Cal. (Class C Open Gas)

Four Top Teams

1. Cleveland Balsa Butchers—425 pts.
2. Portland Gas Hoppers—360 pts.
3. Chicago Aeronuts—250 pts.
4. Cleveland Control-Liners—235 pts.

Lowest Official Speed in Control Line

Dave R. Webb, Dallas, Tex.—36 mph

National Champion

M. L. Huguelet, Chicago, Ill.—210 pts.

National Sr. Champion

Jack Norris, Lakewood, O.

National Jr. Champion

Davis Slagle, Burbank, Cal.—100 pts.

National Novice Champion

Frank Davis, San Diego, Cal.—100 pts.

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BANTAM A $18.50

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Arden .199	(Class A)	23.50*
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Rogers 29	(Class B)	$16.75*
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O. K. Super 60	(Class C)	21.00*
Pacemaker 58	(Class C)	24.95
Rocket	(Class C)	22.50*
Vivell Twin	(Class C)	35.00*
Minijet (Jet Propulsion)		35.00*

*Includes coil, condenser, high-tension lead and ignition wire.

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GOTHAM carries every gas kit of approved design and tested performance. Careful handling and prompt shipment. Satisfaction guaranteed.

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Strato-Streak (A-B)	2.50
Stanzel Interceptor (A-B)	2.98
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Varsity (B)	3.50
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Master Crusader (B-C)	7.50
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Bay Ridge Pacer (C)	4.95
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Mercury Standard (C)	5.50
Playboy Sr. (C)	4.50
Comet Sailplane (C)	8.95
Capitol Flamingo (C)	9.95
Super-Sunduster (C)	8.95
Zombie	3.00

CONTROL LINE

Tether Streak (A, B, or C)	$3.50
G-13 Biplane (A, B, or C)	7.95
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Dreamer (A, B, or C)	7.95
Strato-Kitten (A and B)	2.95
Girard Globe Swift (B)	7.50
Scientific Atomic (B)	3.50
Bipe (B and C)	3.95
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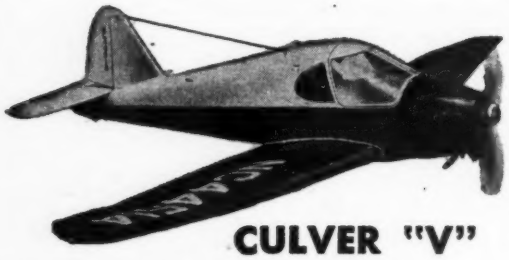

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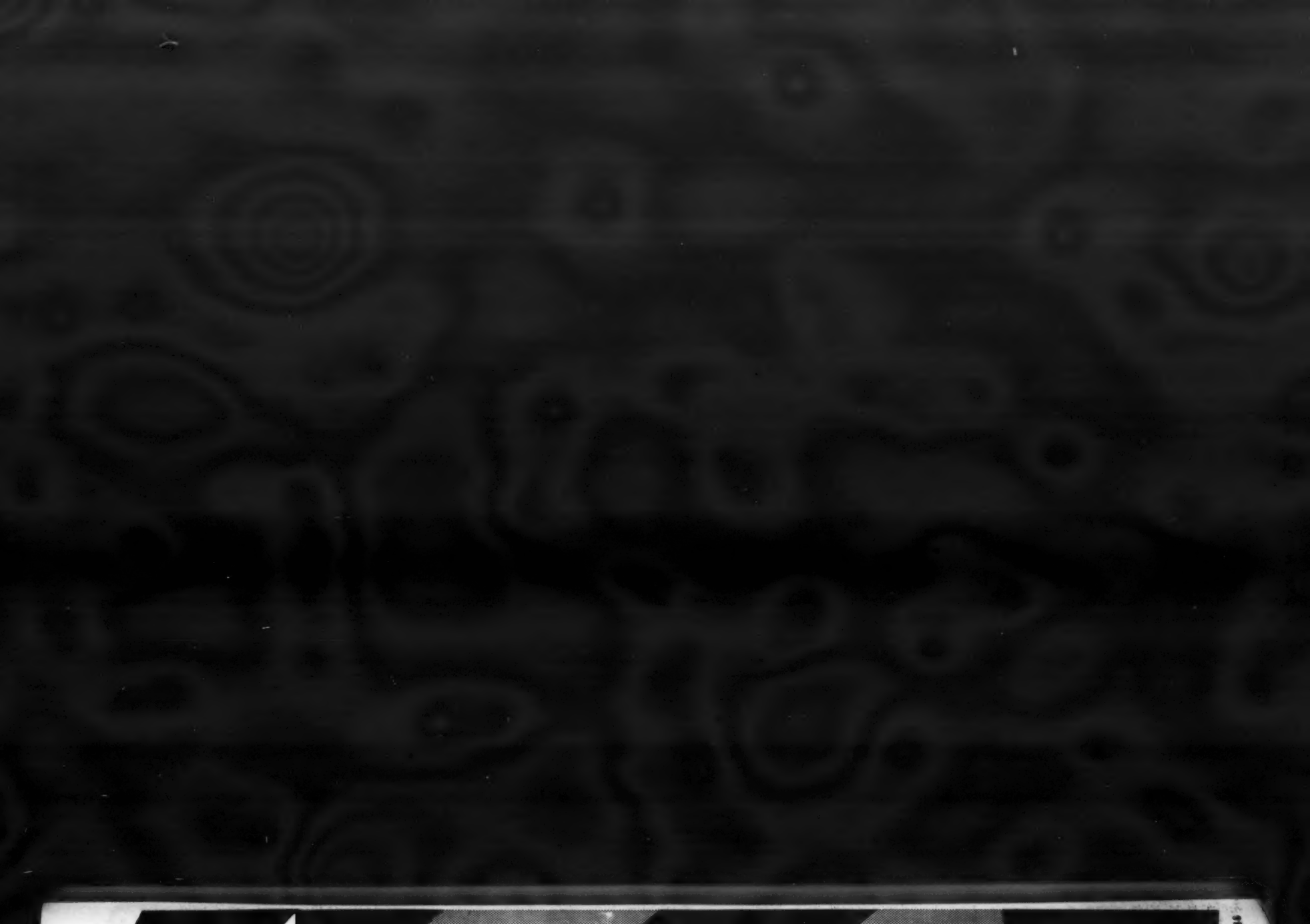

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